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The Chemical Age

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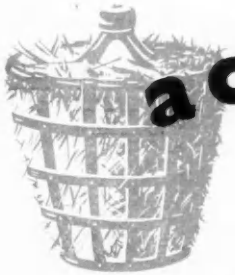

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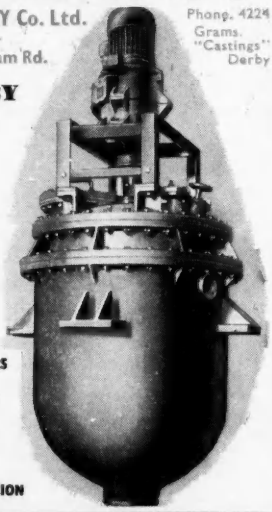

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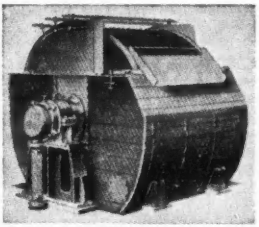

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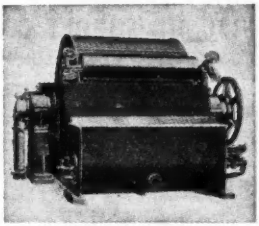

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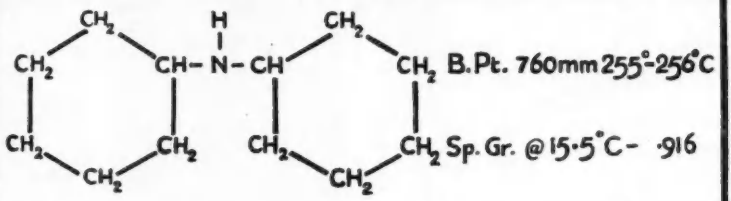

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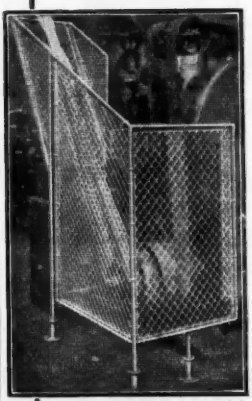

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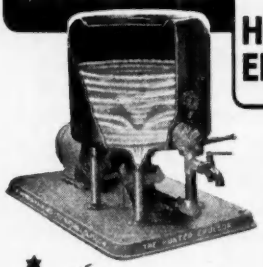

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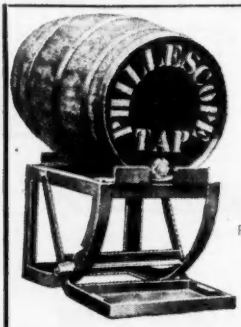

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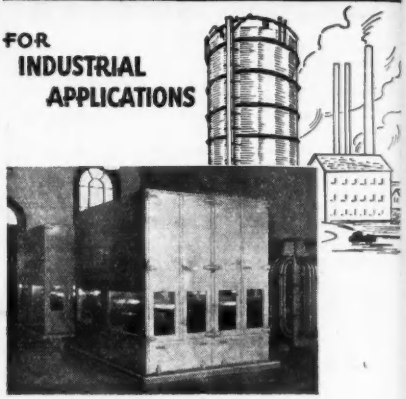

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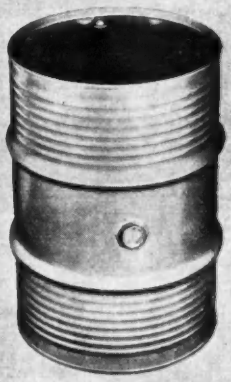

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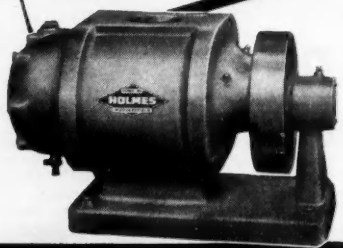

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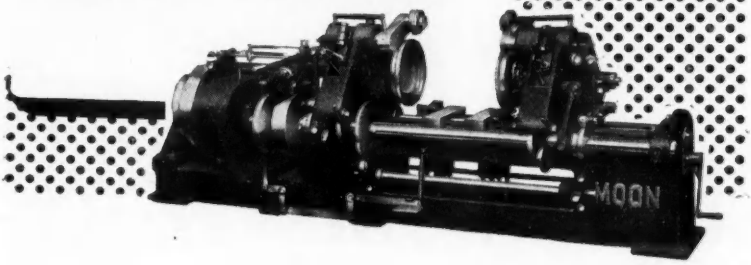

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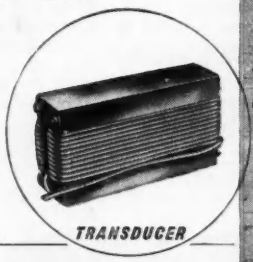

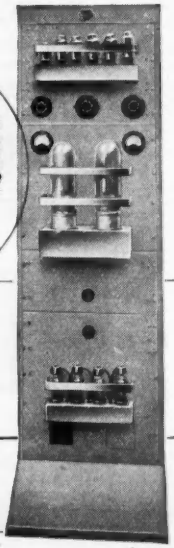

These generators possess the following features:

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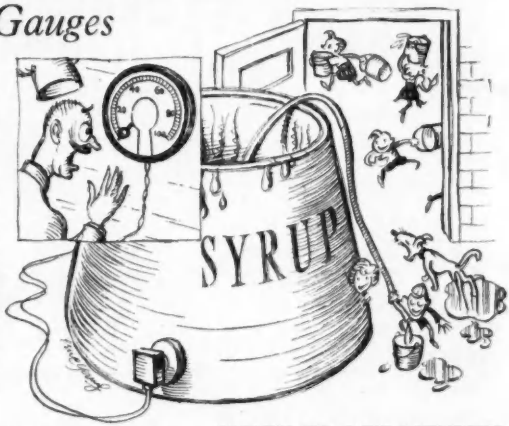

The gauge consists of a transmitter fitted near to the base of the tank and connected by two wires to one or more indicators or chart recorders installed at any convenient control centre in the factory. A controller can also be included for the automatic regulation of pneumatically operated valves.

The transmitter contains a diaphragm which is exposed to the pressure of the liquid in the tank. Through a system of compound levers the deflection of this diaphragm is opposed by the attraction of a coil by an electro-magnet, the current through the coil being automatically varied so as to balance the pressure on the diaphragm. The current through the coil, which is therefore a measure of the tank contents, passes through the remote indicators and recorders which are connected electrically in series.

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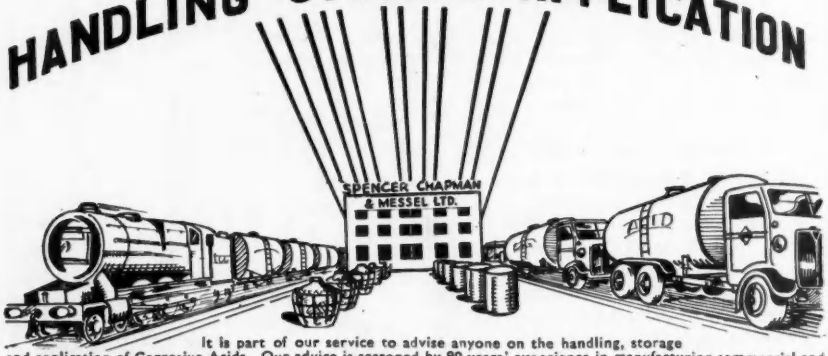

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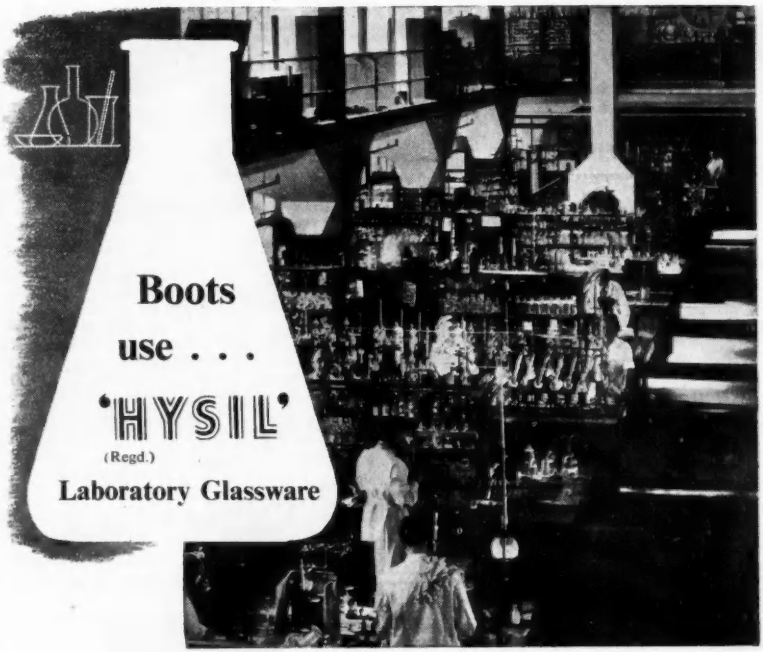

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The Election

BEFORE we are thoroughly involved in the rough and tumble of a General Election it is good to pause to take a glance at the general situation and strive to formulate a sensible line or policy. All the political parties are so engaged, but the task should not be left to them. The business man and citizen who professes no particular enthusiasm for parties should also take his bearings and endeavour to visualise the needs of the situation as he sees them (writes Sir Ernest Benn).

The political candidate who carries on the disastrous game of mass bribery, and asks the people to continue to believe that votes can perform the impossible, is deliberately doing his share in the further degradation of our public life. We have completed five years in which Socialism has held full power, but few thoughtful men have so limited a vision as to believe that the decrepit condition of the body politic and economic is entirely due to what has happened in five years. The blame must be shared by all political parties which have led the unsuspecting to attach a cash value to the franchise. One way and another, we have reached a wholly unprecedented position—£4000 million of annual public expenditure. It must be assumed that the vast obligations represented by this figure have been undertaken in the interests of all, and that all share in services costing £6 per week per family.

On February 23 the worker will have the opportunity of showing how far he understands what has happened, and how far he is satisfied with the value received for a sum as large or larger than he himself is able to earn and spend. The money is poured out for purposes he nominally has approved, but his control in the matter is, admittedly, extremely remote. Seeing that the Socialists are about to celebrate the first 50 years of their party life, it is not out of place to remind ourselves that this £6 per week per family, for all the purposes of government, is the modern counterpart of the 3s. per week per family with which Salisbury and Gladstone did everything that any Government up to that time had ever done. With that they put John Bull on the very top of the globe. Now, while spending £4000 million, and enjoying what is so curiously called full employment and "security"—in

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The annual subscription to THE CHEMICAL AGE is 30s.; single copies, 9d.; post paid, 1s. SCOTTISH OFFICE 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited

a world where no such thing exists, we are still running into debt on import and export account, in dollars and other currencies, to the tune of nearly £10 million a week.

The need for repeal, retrenchment and reform is obvious. Whether a people taught to look to the State to ensure their livelihood are ready for such a policy is admittedly in doubt. The word "repeal" is too little in favour, perhaps because of the existence of the powerful vested interest in bureaucracy which prefers the complications of amendment. Here, however, is a practical point on which more insistence should be laid. The past five years have seen more legislation than any previous time; measures have been rushed through the House of Commons, sent to committees which were never intended to deal with questions of high policy, put through these same committees by the force of the guillotine and incorporated in the Statute Book before anybody but their bureaucratic authors had had time to digest them. It is quite inconceivable that this enormous mass of new and experimental law can all be of the needful quality. Some of it is ill-conceived and deliberately harmful.

The businesslike method with much of this would be straightforward repeal and, after due consideration, the reintroduction as new legislation of anything worthy of being retained. The evidence for this can be seen in the latest Town and Country Planning Act, under which it is unlikely that any individual will ever again take the risk of laying one brick upon another. Such simplification as only repeal can achieve is shown to be essential by the recent offer of the Stationery Office, for 65 gns., of 35 volumes of departmental orders, rules, and regulations, under which we are supposed to carry on our business and conduct our lives. That simple fact, which makes a mockery of all our vaunted freedoms, should warn us against the habit of amendment, which only means that these orders, most of them already incomprehensible to the lay mind, will become worse confounded, and act as a further discouragement to a people who need nothing more urgently than the feeling of liberty to move.

Retrenchment is the short, simple and complete answer to inflation, and if put forward in that way should make a strong appeal to a people living under a threat which few can fail to understand. The situation really calls for a liquidator to handle a problem

(*continued on page* 116)

Notes and Comments

Technology in Universities

TECHNOLOGY and applied science are liable to occupy the status of poor relations in the university curriculum. That at least is a theory to which a good many people will subscribe who knew the pre-war university better than the contemporary one. That theory, however, now seems to have been thoroughly discredited by the latest statement of policy by the University Grants Committee whose influence on university values is anything but negligible. This pronouncement represents the highly informed opinion of a technology subcommittee of 13 under the chairmanship of Dr. A. E. Trueman composed of people of the calibre of Sir Charles Darwin, Mr. H. W. Cremer and Sir Charles Ellis, whose recommendations to place technology studies on a firmer, expanding basis in universities appear to have received the ungrudging support of the Grants Committee. This growth, as the latter committee observes, has acquired most of its vigour since the war. In 1938-39 there were 5288 students of applied science in the universities: today there are 10,916, excluding those studying chemistry and physics in preparation for entry into industry.

Differing Functions

IT is clearly the intention of the Grants Committee to open the gates considerably wider, without allowing any lowering of the standards as a concession to expediency. If these opinions receive the respect they deserve it may be expected that gradually there will be a clearer demarcation of the teaching responsibilities in this regard of the universities and the technical colleges, which should simplify and invigorate the performance of both. Applied science and technology in universities will be more widely based on higher standards of fundamental science and contain a smaller element of training concerned with immediate work in industry. Some overlapping in the colleges and universities is unavoidable, but this clearer definition of functions should greatly improve the prospect of a more ample supply of technologists of two kinds—those who are urgently needed now, especially in chemical engineering, and men with the wider background, fitted to grapple with the unfamiliar problems which will emerge as changes occur in industrial objectives.

Better Liaison

THE desirability of bringing people together for mutual enlightenment is recognised today in all strata of the community, and chemical industries have certainly not been backward in establishing the merits of the principle. It is encouraging to note that the same idea in several forms has been the basic motive of an important proportion of the work during the past year of the Chemical and Allied Trades Section of the Manchester Chamber of Commerce. The work of the section in promoting the exchange of information by personal contacts between producers and users of chemicals is typical of the very practical outlook of the Manchester chemical group. Chemical users can be divided into a great number of classifications, but all are capable of giving and receiving some data which will heighten the economical use and effectiveness of the chemicals produced for home industries. That, indirectly, lends force in more ways than one to the endeavours to enlarge the export trade. The fact that very few chemicals are now cheap has not ruled out the possibility that several of them are still being used to some extent ineffectually, either because of comparative unsuitability or of limited knowledge of their full potentialities. The laundry industry, which the Manchester group has singled out for liaison work, is certainly not the least knowledgeable of industrial chemical users: but in view of the comparative novelty of

some current practices in detergency and the number and bulk of chemicals which a modern laundry uses, the talks should provide real benefits to the chemical industries around Manchester and to the British Launderers' Research Association, whose collaboration has been sought.

Two Nations' Instruments

FULLER opportunities than commonly offer to see the advances which 1949 has yielded in the department of scientific instrument technology will materialise early this year at two exhibitions to be held in London. The 34th annual exhibition by the Physical Society at the Imperial College of Science and Technology (March 31 to April 5) is to have a longer lease of life than its counterpart in 1949, and once again some of the entries in the craftsmanship and draughtsmanship competition for apprentices and learners will be on view to indicate what sort of standard of performance in the fundamentals is being maintained by the next generation of instrument makers. French scientific circles are responsible for the other exhibition to be held from February 9-26 at the Science Museum, South Kensington—possibly a return for the successful example of international scientific co-operation set by the Davy-Faraday exhibition organised by the British Council and held in Paris in 1948 (THE CHEMICAL AGE, *59*, 183). Exhibits will give British scientists a view of instruments for physical research, photography, medical physics, chemistry, and civil and mechanical engineering. The display is under the patronage of the Cultural and Commercial Counsellors to the French Embassy and will represent the work of the Centre National de la Recherche Scientifique, the Office National d'Etudes et de Recherche Aeronautique, the Commissariat a l'Energie Atomique and a number of scientific instrument manufacturers. That assures that it will be fully representative of recent French achievement, the picture of which will be filled in by papers by some of the French authorities.

Coconut Boom

THE fact that some vegetable oils continue to command one of the few remaining sellers' markets was proved with disconcerting results in Ceylon about a week ago. The boom in coconut products, copra rising to the unprecedented level of Rs.185 per candy, which took effect almost as soon as the United Kingdom long-term buying contract came to an end, attested how urgent is the demand for edible oils. The Colombo authorities can scarcely have foreseen how startling would be the effect of establishing a free market for one of the island's principal sources of revenue. It produced, among other things, a crisis in the coconut oil milling and associated industries, a large proportion of which closed down rather than pay the free market prices. The Government, faced with the probability that it might not be able to fulfil its own contract to supply to 10,000 tons of coconut oil and the likelihood that Ceylon processers would lose their markets, hastily banned all further exports of coconuts and copra. Our Colombo correspondent, who sends this evidence of the scramble which can result at the breakdown of a long term of Government regulated commerce, has not indicated how the U.K. Ministry of Food has fared in this coconut crisis. Canada has already indicated the possibility of doubling her purchases of Ceylon coconuts and products.

THE ELECTION

(*continued from page* 114)

that is not uncommon in the industrial world—the problem of over-trading. If a liquidator could first of all repeal a few of these 35 volumes of orders, next reduce the rest to a sound economic basis, then the road would be clear for such reforms as a sadder, wiser and chastened people would demand. What is quite certain is that any political party lending itself to further promises of ease, wealth, leisure or comfort, is doomed to a very short life and a discredited end.

CHEMICALS AID TRADE RECOVERY

Manchester Group Surveys Recent Factors

THE sustained interest of the Manchester Chamber of Commerce in all sections of the chemical industry was well illustrated in the annual report of its Chemical and Allied Trades Section, presented at the recent meeting, at which Mr. T. C. Fawcett (General Chemicals Division, I.C.I., Ltd.) presided, and was re-elected chairman.

The report pointed out that 1949, above all years, was one calling for increased production from all sections of industry, and in consequence it was necessary for the chemical industry to meet heavy demands for its many products needed in the manufactures of the country. These demands were met with great success and the industry could take pride in observing the increased figure of national exports, since it could justly be claimed in respect of the majority of other manufacturing industries that some important chemical product had played its part in the creation of their goods.

Nor had the chemical industry slackened in its own direct export efforts as the official monthly figures (published regularly in THE CHEMICAL AGE) revealed. The industry's efforts to assist in bringing about our national recovery was further emphasised by a substantial reduction in the figures relating to chemicals, etc., imported into the country.

These results had been achieved in spite of many difficulties which still prevented full development of the industry's potential output, not the least of which had been the continued restriction of capital expenditure. Many projects envisaged to increase the industry's capacity had, in the national interest, had to be postponed or reduced in scale.

Shortage of Trained Personnel

The committee had met regularly throughout the year and had had under consideration several matters of importance to members of the chemical section. A long standing problem which came before the committee was the shortage of suitably trained technical personnel for entrance into the industry. It was felt that much might be done to improve the situation by assisting university graduates to co-ordinate their university training with current needs of industry. This theme was developed in discussions between members of the committee and the secretary of the Manchester University Appointments Board, and at a meeting of the chamber's board of directors.

As a result of these discussions, action would be taken in the near future to stimulate greater interest among members of the section in the scheme conducted by the appointments board, under which students obtained employment with manufacturers during the summer vacation.

The chemical industry had continued to achieve a high level of exports and since in so many cases this trade was dependent upon quantities permitted under bi-lateral agreement negotiated between the U.K. and other countries, negotiations for such agreements and their operation had been kept under close review.

Overseas Inquiries

Evidence of the growing interest shown by members in the export trade was revealed by the increased number of inquiries received during the year by the trade inquiries and tariff departments of the chamber. These departments had been of special help to members in connection with agencies, licensing and tariff matters.

The announcement in September of sterling devaluation gave hope of increased exports to the markets of Canada and the U.S.A., and there was evidence of the industry's intention to take full advantage of the changed situation. When the Export Credits Guarantee Department announced new facilities to stimulate trade with these markets, many members of the chemical section were present at a meeting called by the chamber when the district manager of the Government department gave details of the new cover to be made available.

In connection with the consideration of export trade matters, the committee had maintained a close watch on the revival of competition from former enemy countries, and the situation had been examined from time to time during the year in an endeavour to ascertain to what extent these countries, particularly Germany, were re-entering overseas markets.

Examples had been produced of the re-emergence of Germany as a competitor in the field of chemicals, but although prices quoted were now causing some anxiety in home circles, exchange problems had so far prevented the full impact of their effect. The matter was one which the committee would continue to observe

closely, and should the need arise all possible measures would be taken to protect the interests of members.

It was regretted that the year had not seen the abolition of purchase tax in respect of drugs and medicines sold under a proprietary name or trade mark. Members would recall that this had been the subject of representations to the Chancellor of the Exchequer during 1948, and it had been hoped that the 1949 Budget would see the end of this anomaly. Such was not the case, however, and manufacturers of proprietary brands continued to incur the burden of tax on their products.

The committee would continue to keep this matter under review in the belief that it was not in the best interests of the industry that the user of a registered brand or name—in most cases a guarantee of quality and purity—should suffer differentiation in the matter of purchase tax.

During the year, the committee had given careful consideration to the need for improved liaison between users of chemicals and chemical manufacturers. Particular thought was given to the case of launderers, who it was felt in some cases were not taking advantage of chemical products likely to be of the greatest use in their business. An approach had been made to the British Launderers' Research Association.

The committee had maintained friendly contact with other sections of the chamber on problems of mutual interest to members of those sections and of the chemical industry.

A valuable contribution towards increased productivity was also reflected in the annual report of the finishing and allied trades section of the Manchester Chamber of Commerce.

In the third quarter of 1949, the dyeing and printing sections attained 83.5 and 76.4 per cent respectively of the 1937 output, compared with 72.6 and 60.8 per cent in the same period of 1948.

Consideration was given to the long-standing problem of the wrongful application of the term " fast colour " to fabrics not dyed by vat colour processes.

Following discussions between the chamber's textile exporters' committee and representatives of the Cotton and Rayon Merchants' Association, members were advised that the considered view of both organisations was that they should not be a party to abuse of the term fast colour, and that the use of fastness labels in the case of goods not dyed in vat colours was to be deplored.

The use of the expression " commercially fast " when placing contracts with dyers was also to be deprecated. Such an expression was not recognised in the trade.

Dutch and Belgian Progress in Antibiotics

PRODUCTION of amino salicylic acid of high purity (for use against many forms of tuberculosis) is reported to have been developed by the Brocachemie of Zaandam, a subsidiary of the pharmaceutical manufacturers Brocades-Stheeman and Pharmacia which specialises in the preparation of organic chemicals.

Equipment—writes our Amsterdam correspondent—is being improved to step up the output of this product, which should ultimately be sufficient to meet all Holland's home requirements.

Production of antibiotics in Holland, particularly penicillin, is reported to have developed more slowly than was hoped, although the Nederlandse Gist en Spiritus, Ltd., is a fairly large producer in Holland and in Belgium.

Belgium, indeed, appears to be giving more attention to antibiotics. A factory is shortly to be erected at Genval, province of Brabant, for making penicillin and streptomycin. It is claimed that processes involved will be less expensive than those used in the U.S.A. although it is not revealed in what respect they differ from the American methods. The Brussels authorities appear to be willing to afford considerable protection to this venture.

The new five-storey factory now being constructed by Imperial Chemical Industries, Ltd., at the Wijnhaven-Leuvehaven port of Rotterdam, is expected to be completed by the end of next June.

A wool-like fibre derived from milk is reported to have been successfully produced by the co-operative dairy Friesland as a result of research undertaken on behalf of all Dutch dairy co-operatives.

Fisons' New Interest

On the retirement of Mr. F. G. Marshall, the business of Julius Hülsen & Co., Newcastle-upon-Tyne, has been acquired by Fisons, Ltd., of Ipswich. The responsibility for sales of blanc fixe and sulphate of ammonia, both products of Fisons' works at Blaydon-on-Tyne, now rests with Whiffen & Sons, Ltd., Fulham, S.W.6.

POST-GRADUATE TECHNOLOGY

Closer Integration of Industry and the Universities

THE close association of technology with fundamental science is essential if technology is to figure at all in the university system. This appears to be one of the main conclusions reached by a sub-committee on technology of the University Grants Committee in a recent note to the Treasury.*

The aspects of technology appropriate to universities and technical colleges are not the same, it is maintained, though they may overlap to some extent.

It would be generally agreed that the work of a university in technology should be much more closely related to fundamental science or other relevant studies than that of a technical college. In general, the courses should be more widely based on higher standards of fundamental science and contain a smaller element of training related to immediate or special work in industry, the sub-committee recommends.

Happy Compromise

British universities had adopted a policy of compromise between the system common in a number of Continental countries, where technology does not appear in the universities, and the American system, where (in the almost complete absence of technical colleges) a great range of work, both in technology and in technical studies, finds its place in the universities. This compromise had been often criticised, and, at first sight, it might appear advantageous to bring the whole field of technology within a single group.

It was, however, good for the whole university that technologists should form part of the student body, the report observes, and it was essential for the well-being of industry that some of their technologists should have been educated in universities, in contact with students drawn from a wide variety of faculties. If all students of higher technology were placed in the universities the numbers would, of course, be so disproportionate that many advantages would be lost.

The normal undergraduate in applied science gained greatly from having some industrial experience at an early stage in his career; the sub-committee therefore approved the arrangements of many universities for providing industrial experience during vacations, which were being extended wth the co-operation of industrial firms.

Post-graduate activities in the field of technology should certainly be extended to include some instruction, as distinct from research. Further facilities for such studies were urgently required and these could be provided in a reasonably short time at a number of universities. They should make provision both for graduates in applied science and for good honours graduates in pure science, in order that a flow of men of varied basic training might be available for technological posts in industry.

Aid from Industry

For graduates in technology, though not for those in pure science, such post-graduate study should follow a period of not less than two years in industry.

The difficulties raised by such a proposal were obvious. Provision of support for the student was essential and some industrial organisations would no doubt be willing to maintain men during this special training; but in other cases it would be necessary to provide assistance from public funds.

It was visualised that provision for some 250 men a year should be made, but this number might be increased when it was possible to make a more accurate estimate of the demand.

Post-graduate courses of one or two years' duration were recommended, such as those successfully instituted at some of the universities.

* A Note on Technology in Universities (HMSO, 4d).

Sulphuric Acid Control to End

A BOARD of Trade announcement this week confirms that control by the board of sulphuric acid will end on January 31.

Thereafter the National Sulphuric Acid Association will act as the board's agents in respect of certain functions hitherto performed by the control, in particular the import and distribution of raw materials for the manufacture of sulphuric acid.

From February 1, inquiries, etc., hitherto sent to the control should be addressed to the National Sulphuric Acid Association, Ltd., at 166 Piccadilly, London, W.1. If these are within their functions as agents for the board, the association will advise. Other matters will be referred to the Board of Trade.

Chemical Materials in October and November

Little Change in Production, Consumption and Stocks

LEVELS of production, consumption and stocks of basic chemicals remained fairly steady in October, 1949. Production of molasses showed a marked increase over the previous month and over October, 1948, while consumption of liming materials again rose well above the figures for September and those of October, 1948.

Estimated numbers of employed in the chemical and allied trades in October (in thousands) reached 444.1 an increase of 3.1 over the total for the previous month. Distribution of workers was as follows: coke ovens, chemicals and dyes, explosives, etc. 255.2 (186.2 men, 69.0 women); paints and varnishes 38.3 (26.9 men, 11.4 women); oils, greases, glue, etc., 66.7 (53.1 men, 13.6 women); pharmaceutical, toilet preparations, etc. 83.9 (42.0 men, 41.9 women).

These figures and the table given below are abstracted from the *Monthly Digest of Statistics*, No. 47 (HMSO, 2s. 6d.).

	October, 1949 Thousand Tons			October, 1948 Thousand Tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	140.0*	144.0	—	133.8*	136.0	—
Sulphur	—	27.0*	87.6*	—	24.0*	66.1*
Pyrites	—	18.7*	68.0*	—	19.5*	66.0*
Spent oxide	—	15.7*	178.4*	—	16.7*	166.8*
Molasses (cane and beet)	70.9	31.1†	246.8	53.2	30.7†	233.1
Industrial alcohol (mil. bulk gal.)	2.23	2.87	3.27	2.15	2.84	8.96
Superphosphate	19.0	19.1	—	17.5	19.5	—
Compound fertiliser	164.2	122.8	—	147.1	121.1	—
Liming materials	—	774.1	—	—	526.6	—
Ammonia	—	6.82*	5.73*	—	6.77*	5.76*
Nitrogen content of nitrogenous fertilisers	20.04	19.85	—	20.52	20.76	—
Phosphate rock	—	96.5	218.9	—	89.5	180.3
Virgin aluminium	2.24	15.2	—	2.41	14.5	—
Virgin copper	—	28.3	143.9	—	31.3	120.8
Virgin zinc	—	18.2	65.1	—	18.3	55.4
Refined lead	—	15.8	61.9	—	18.1	13.6
Tin	—	2.24	22.5	—	2.01	17.8
Zinc concentrates	—	13.9	74.0	—	12.9	30.0
Magnesium	0.46	0.30	—	0.33	0.41	—
Pig iron	187.0*‡	139.0	495.0*	185.0*	137.0	274.0*
Steel ingots and castings (including alloys)	315.0*‡	—	1,296.0	303.0*	—	1,006.0
Rubber: Reclaimed	0.43‡	0.43‡	2.63	0.43‡	0.43‡	4.25
Natural (including latex)	—	0.42‡	44.7	—	4.68‡	62.6
Synthetic	—	0.05‡	1.37	—	0.05‡	2.16

* November. † Distilling only. ‡ Average of five weeks.

The October figure for sulphur stocks, erroneously printed in our issue of December 17, should have been 85·5 thousand tons.

Chemical Industries' Good National Savings Record

BRITAIN'S industrial savings groups, with their membership of nearly three million people, account for two-thirds of all the money invested through group saving and contribute nearly £1 million a week to National Savings. For industry as a whole the average figure per head for employees saving through groups in the larger concerns is 6s. 6d. a week. Those in the chemical industries save 7s. 7d. Latest available figures of saving for three months in chemical firms employing more than 500 show that group members in these industries have saved a total of £241,389, and nearly 49,000 people are saving through 116 groups.

Though these high saving figures show that the chemical industries are playing an important part in the industrial savings campaign, there is thought to be still room for improvement. This can be brought about by higher membership of existing groups, or by providing savings facilities in firms where none at present exist. The methods of group saving in industry are varied and flexible, contributions either being collected in cash or, by agreement, deducted from pay.

The direct transfer method, by which savings are voluntarily deducted from pay and then transferred into the employee's savings bank account, is becoming increasingly popular in the bigger chemical concerns, while in a number of smaller firms savings stamps are sold. Savings are stimulated in many industrial areas by keen contests between different firms.

NATURAL RUBBER PROSPECT

More Scope in U.S. Markets ?

BETTER prospects for British natural rubber may derive from two decisions of which news is given this week. The Rubber Development Board has given some details of Malayan rubber producers' new decision to provide £3 million for research and development in the interests of the natural product. Supporting that plan, the Malayan producers are to give effect to a programme to improve the standing of Malayan rubber in the U.S.A.

It is intended that producers and rubber manufacturers shall work together to this end, without seeking either to raise prices of the natural material or to campaign against the qualities of the synthetic counterparts, which now monopolise a very large proportion of the American market.

The other good augury for British rubber, which is the British Commonwealth's largest single source of dollar trade, is the more liberal attitude shown in the recommendations on the control and use of synthetic rubbers which the President submitted to the U.S. Congress on Monday. Although Mr. Truman confirms the conventional American view that synthetic rubber capacity must be maintained, for strategic reasons, at a level adequate to supply the needs of any emergency, he forsees that consumption might safely be reduced to 200,000 tons annually, but not below 25 per cent of the total use of natural and synthetic rubbers.

In a separate report, the assistant to the President, Mr. John R. Steelman, has urged that American security would not be served by impoverishing the countries supplying natural rubber.

DOLLAR INVESTMENTS

Silicones and Refractory Industries

THE Dow Corning Company, Midland, U.S.A., is to invest $21,350 to assist the establishment in France of an industry to manufacture silicone insulating products. The French firm concerned is the Société Industrielle des Silicones, a branch of the Manufacture des Glaces et Produits Chimiques de Saint-Gobain, and the investment comprises a payment in cash, delivery of raw materials and their transport cost (in dollars).

It is thought that production will start within a year and monthly output should be 1.5 to 3 tons. This will replace the purchase of silicone materials from the U.S.A., worth $35,000-$50,000 a year.

The French market is likely to absorb yearly a quantity equivalent to a value of $100,000-$250,000, allowing a surplus for export to other European countries.

$40,000 for French Refractories

The ECA has announced in Paris that the Corhart Refractory Company in Louisville (Kentucky) has invested $40,000 in the works of the Compagnie Française Electro-Réfractaire. This sum will be used for the construction of a new electric oven designed for the production of melted and moulded refractories which enjoy a steadily increasing demand from glass manufacturers in France and other countries.

The French company has had for several months more orders than it could readily supply, largely from glass manufacturers in France, Belgium, Great Britain and other European countries. France needs an increasing quantity of refractories for the projected modernisation of her glass industry.

Moving to Scotland one of the vast distillation columns required for the Shell Company's plant at Stanlow recently presented unconventional traffic problems

STATE CHEMICALS

Hints Renewed in Election Manifesto

SUGGESTIONS that a Labour Government, if returned to power at the forthcoming General Election, may take the decision as a mandate to bring sections of chemical industry under State control are contained in the manifesto which the Labour Party issued on Wednesday. According to this, "Let Us Win Through Together," chemical industry would be carefully examined by a reinstated Labour Government and "any appropriate sections" might be placed under public ownership, if that were necessary to assure national interests.

The earlier Labour Party policy statement for popular consumption, "Labour Believes in Britain," sought to represent some chemical industries as monopolistic concerns, referring more particularly to Imperial Chemical Industries, Ltd.

The latest statement largely confirms the earlier policy, indicating that it is intended to nationalise these further industries:—

Beet sugar manufacture and sugar refining; the cement industry; all suitable minerals; food-producing land not fully used; water supply; the wholesale distribution of meat; all cold storage plant.

New Detergent

IN Lensex 390, the latest addition to the range of detergents marketed by Shell Chemicals, Ltd., the petroleum industry has, it is stated, been enabled to provide for launderers and textile manufacturers a cleanser which will deal successfully with what is known as white work.

Shell Chemicals claim that this product, by comparison with its predecessors of the Teepol type, has better detergent properties, greater lathering power, better wetting and lime-soap dispersing qualities.

Such has been the interest shown in petroleum-based detergents by launderers and textile manufacturers that the Shell Company found it had become necessary to set up its Textile Service Laboratory in Bradford, to deal with the cleansing problems of those industries.

New grades have also been added to the Shell range of Apiezon oils, greases and waxes for high vacuum work. The C grade of oil is intended for use in condensation pumps where the lowest pressures are required; its vapour pressure at room temperature after evolution of dissolved air is 10^{-8} mm. mercury.

NORWEGIAN WHALE OIL

Britain's £4 m. Purchase

MUCH of this season's Norwegian whale oil production has been sold in advance, writes the newspaper *Tönsberg Blad*, quoted by the bulletin of the Royal Norwegian Information Service, London. Britain is the largest foreign buyer and has bought 50,000 tons at £80 a ton—£4 million altogether. Another 10,000 tons have been sold to Western Germany, which is also buying 7000 tons of processed whale fat from Norway.

The Norwegian Government is stipulating that 42,000 tons of whale oil should be reserved for the home market at a price below the current market price. The total production of whale oil by Norwegian expeditions this season is expected to be at least 160,000 tons. It is presumed that 100,000 tons of this will be available for processing into fat in Norwegian factories. Such oil realised £100 per ton outside Norway last year.

During the first 11 days of the Antarctic whaling season which began in December, the 10 Norwegian expeditions produced 101,660 barrels of whale oil, roughly the same as in the same period last year.

December Steel Output

BRITAIN'S production of steel ingots and castings in December was at an annual rate of 15,153,000 tons, compared with 14,678,000 tons in the corresponding month of last year, and 16,358,000 tons in November. This was the highest rate of production ever achieved in the month of December.

Pig iron output was at an annual rate of 9,659,000 tons compared with 9,150,000 tons in December, 1948, and 9,745,000 tons in November.

With an aggregate steel production for the whole of 1949 of 15,552,000 tons, the industry exceeded the upper limit of the Government target set at 15,250,000 tons.

U.K. Trade in December

EXPORTS from the United Kingdom in December were (provisionally) £153.8 million, bringing the provisional total for 1949 to £1784.6 million or 13 per cent more than the 1948 total.

The final quarter of 1949 was marked by a considerable increase in exports, the total of £470.2 million exceeding by £10.3 million the figures for the first three months of the year.

Imports in December were provisionally estimated at £195.4 million.

Drugs and Fine Chemicals in 1949

Stages in the Development of Cortisone

By G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

AS the last decade entered its final years it seemed impossible that the tempo of discovery and development of biochemicals and some related substances could fail to slacken. The pace for some 10 years had been phenomenal and seemed incapable of being maintained. Apparently it could, because virtually every year has revealed the culmination of at least one development of great significance.

Such results have been the reward of an immense body of research sustained by those, relatively few, qualified to contribute in the very complex phase in which such studies have now entered.

Seldom aware of more than the results and the amelioration of the human lot which they bring about, the layman may be excused for commonly seeing all this as no more than the rabbit from the conjuror's hat, whose failure to materialise would have been more arresting than its actual appearance.

The scientist seeks further for the roots of both problem and solution; he seeks for relationships with contemporary progress in other fields; he speculates upon the repercussions of the new findings in other, and often diverse, problems. But as scientists, we all fall short of perfection and are not true followers of the faith.

After Ehrlich

The reviewer seeks refuge in the thought—first Ehrlich, then the deluge! And an appropriate thought at the end of a half-century. Salvarsan, then the sulphonamides; penicillin and the antibiotics; then folic acid and, with the aid of newly developed chromatographic procedures, vitamin B_{12}; the vasoconstrictors, the antihistaminics. Admittedly, the antispasmodics and analgesics seem to derive from some lineage other than old father Ehrlich; but, doubtless, some diligent searcher in the field could find that, at some point or another, directly or indirectly, Ehrlich had made his intellectual contribution to this comparatively narrow and specialist field. And now cortisone and the hope and expectation that some of the painful ills that flesh—and especially aged flesh—is heir to will fall away at its magic touch.

Cortisone has its own long family tree; but, arbitrarily, it is permissible to start with consideration of the work of Hench and his associates, who have devoted their professional lives to the study of rheumatism and rheumatoid arthritis. These conditions, while only too well known by their effects, are so diffuse as to make classification difficult and impede study.

Against Rheumatism

A number of attempts at classification have been made from time to time. One classification has been proposed by the British Medical Association (*Brit. Med. J.*, 1933, 1033); another by the Ministry of Health (*Reports on Public Health*, No. 23, 1924); and yet another in 1934 by the International League against rheumatism. These and others reflect both the widespread interest in the subject and its difficulties. The following clinical classification is derived from one proposed by the Royal College of Physicians in 1936:—

1. Acute rheumatism (rheumatic fever) and sub-acute rheumatism.
2. Non-articular rheumatism (fibrositis, myalgic, lumbago, sciatica, etc., possibly neuritis).
3. Gout—acute and chronic.
4. Chronic arthritis. The rheumatoid type mainly affects women and especially at the beginning and the end of the child-bearing period. Inflammatory in nature it may be of unknown origin. Alternatively the origin may be known to be gonorrhœic, dysenteric, metabolic, etc.
5. Osteoarthritis. Mainly affects men and the larger weight-bearing joints. The general health may be unaffected. May be of unknown ætiology. Or may be senile or due to known shocks or central nervous disease.

This classification seems wide enough, yet some 10-15 per cent of known cases cannot be fitted into it.

That rheumatic diseases have now for some years been tackled on an international scale, is not surprising, in the light of the estimate that nearly 17 per cent of the industrial invalidism in England and Wales has been due to rheumatic disorders. They are thought to be responsible for an estimated loss of 3 million working weeks each year at an estimated cost to industry of £2 million. In the

U.S.A., 6 per cent of the population of 127 millions were considered to have suffered from rheumatism in 1936 (*The Med. Press*, 1949, *222* (17), 391). The magnitude of the problem is immense.

Hench and his colleagues at the Mayo Clinic have latterly been impressed particularly by the reversal of the progress of rheumatoid arthritis by such conditions as pregnancy; the systemic shocks of starvation or of surgical operation; or by jaundice. In these instances the disease seemed to undergo some inexplicable remission.

Causation of Rheumatism

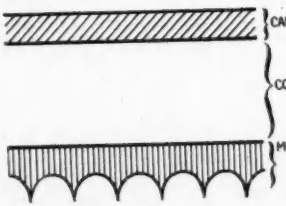
In association with Kendall (Division of Biochemistry, Mayo Foundation), the widely-held microbic theory of the causation of rheumatism was completely abandoned.

This led to the postulation of the existence of an "antirheumatic factor, *x*" which, potentially, was capable of reversing the progress of the disease. On the evidence which gradually became available it seemed that in every case of remission the common factor was that the suprarenal gland was stimulated.

In mammals there are two suprarenal glands which, in most species, are situated one each on the upper part of each kidney. The position among all mammals is not invariably in juxtaposition with the kidneys; for this reason it is preferred that they be referred to as the adrenal glands. Atrophy of the adrenal glands, or their surgical removal (adrenal-ectomy), leads to the death of the animal.

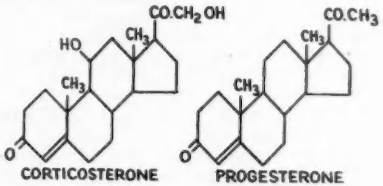
The commonest form of disease of these glands is Addison's Disease in which the salt metabolism of the body gets out of control resulting in an excessive secretion of sodium chloride in the urine and a corresponding reduction in sodium chloride content of the blood, often accompanied by pigmentation of the skin.

The adrenal gland consists of three principal parts and at least two of them secrete a battery of hormones:—



The active hormone of the medulla is adrenaline (epinephrine; alpha-(3: 4-dihydroxyphenyl) - beta--methylaminoethanol) a sympathomimetic amine, the action of which on the cardiovascular system was first demonstrated in 1895 and its structure elucidated by a number of workers over the period 1897 to 1904. It was synthesised independently by Stolz and Dakin in 1904 and 1905, respectively.

The adrenal cortex has been found to secrete several physiologically active steroids, one of the more active of which is corticosterone which closely resembles structurally the female sex hormone, progesterone, which is secreted by the corpus luteum.



Evidence seems to be accumulating that the functions of the hormones of the adrenal cortex and the functions of the hormones of the sexual apparatus are closely connected phyisiologically and biochemically.

Extracts of the suprarenal gland have been available to medicine since 1927 for the treatment of such conditions as Addison's Disease. One method of preparation of a suitable extract has been described by Cartland and Kuizenga (*J. Biol. Chem.*, 1936, *116*, 57).

The Adrenal Cortex

As a result of his studies of the adrenal cortex, Kendall has recovered some 20 distinct substances from it. Some of these were devoid of apparent physiological effect; but he was able to divide the active constituents into three categories:—

Group 1.—Regulating the body's salt supply.

Group 2.—Consisting of sex hormones.

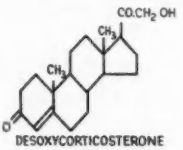
Group 3.—Containing two structurally similar steroids described originally as Compound E and Compound F.

In 1934, Kendall isolated a crystalline substance, essential to the life of the animal, from the cortex (*Proc. Mayo Clinic*, 1934, *9*, 245). A number of other workers — Reichstein, Wintersteiner, Pfiffner, etc.—isolated various crystalline components before the end of 1936.

The principal active constituent of Group 1, above, was found to be desoxycorticosterone, a powerful regulator of salt metabolism, upon which the constituents of Group 3 had practically no effect.

As in the case of œstradiol (a reduction product of œstrone), desoxycorticosterone was synthesised (by Steiger and Reichstein; *Helv. Chim. Acta*, 1937, *20*, 1164) before it was isolated from its endocrine source (by Reichstein and Euw; *Helv. Chim. Acta*, 1938, *21*, 1197).

Desoxycorticosterone in the form of its acetate (21-acetoxy-Δ^4-pregnone-3 : 20-dione) found official recognition in the British Pharmacopœia in 1948.



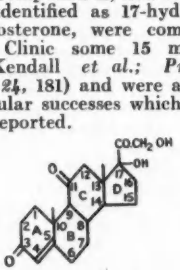
DESOXYCORTICOSTERONE

Its chief use is in the treatment of Addison's Disease.

It is in the physiologically active Group 3, however, that present interest mainly lies. This group has been found to have little effect upon the body's salt metabolism, but a very considerable effect on its carbohydrate metabolism, as well as on muscular activity and its ability to resist stresses, cold and toxic substances.

Kendall is reported to have suggested to Hench that compounds E and F be tested in the treatment of rheumatoid arthritis in accordance with the thought that the systemic shocks which produced remission of the arthritic condition were possibly associated with the stimulation of the adrenal gland.

Trials of Compound E, now named cortisone, and identified as 17-hydroxy-11-dehydrocorticosterone, were commenced at the Mayo Clinic some 15 months ago (Hench, Kendall *et al.*; *Proc. Mayo Clin.*, 1949, *24*, 181) and were attended by the spectacular successes which have been so widely reported.



CORTISONE; or, Kendall's Compound E; or, Reichstein's Substance F; or, 17-hydroxy-11-dehydrocorticosterone

The clinical and biochemical features of rheumatoid arthritis were found to be dramatically improved by daily intramuscular injection of cortisone crystals reduced 5 to 10μ in size and suspended in saline. (Subsequently, cortisone acetate was used.) In a matter of hours patients lost their tenderness, pain and stiffness and developed a pronounced feeling of well-being. Daily administration of 100 mg. cortisone has been found necessary.

The injections must be repeated each day as withdrawal causes the patient to revert to his arthritic condition. This need for continuous administration of the drug is paralleled in the case of another hormone, insulin. Side reactions have to be very carefully watched and there is a liability for the development of obesity, hirsuteness, amenorrhœa in women, depression, etc.

So far only minute quantities of the drug have become available and only a handful of patients have been treated. Kendall, *et al.* showed Compound E to have the above structure in 1938 (*J. Biol. Chem.*, 1938, *124*, 459). The carbonyl group in C-11 is very characteristic. It was found not to show the usual keto reactions or to add methyl magnesium iodide. The compound was reported to behave like a hindered ketone which enolised with the liberation of methane.

The synthesis of cortisone has been found extremely difficult, time-consuming and costly. Synthesis was first achieved by Dr. L. H. Sarrett, of the Merck Laboratories in 1946; but it took until 1948 to accumulate sufficient material for clinical trials. There are reported to be some 30-odd stages in the synthesis, which requires many months for completion.

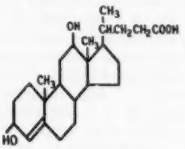
Compound E

As soon as the activity of Compound E was established and its structure worked out the search for a suitable raw material commenced. Since cortisone, in common with the sex hormones, the plant glycosides, and the sterols, is a *cyclo*pentenophenanthrene derivative, the naturally occurring steroids were clearly indicated as possibilities. The bile acids seemed to be the most readily available source and it is reported that, at present, the bile from every animal slaughtered in the Chicago stockyards is set aside for the synthesis.

But the product from 40 head of cattle is required to produce sufficient cortisone for a single daily dose for one patient, and there are 6 million arthritics in the U.S.A. alone. There would not be enough ox-bile in the world to treat all sufferers. It is estimated that the material currently costs about £250 per gram and that 200 grams is about the present peak production in the U.S.A.

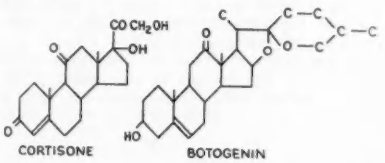
The principles involved in the manufacture of adrenal cortical hormones have been described by Kendall *et al.* (*J. Biol.*

Chem., 1946, *182*). The particular bile acid used is desoxycholic acid which, like all the bile acids, is a derivative of cholanic acid and which is specifically 3: 12-dioxycholanic acid.



As will be seen later, the particular interest in desoxycholic acid is the hydroxyl in the C-12 position. Sarrett's important contribution was the devising of the step which enabled the necessary hydroxy group to be introduced at the C-17 position.

Alternatives to the use of ox-bile are now being intensively sought, especially in the plant world. A preliminary source is the steroidal sapogenin, botogenin, which occurs in the yam, *Dioscorea mexicana*. Botogenin has been studied by Marker and Lopez (*J. Amer. Chem. Soc.*, 1947, *69* (2), 2397) who produced it by alcoholic extraction of the plant, followed by acid hydrolysis and subsequent solvent extraction and crystallisation. Its structural relationship with cortisone is shown below:—



Another source of raw material is the seeds of the tropical vine, *Strophanthus sarmentosus*, a plant which requires five years to mature before seed is borne. One ton of this seed would be required to yield enough cortisone for one patient for one year. In this case the active constituent in the plant is the crystalline aglycone, sarmentogenin, a trihydroxy-$\alpha\beta\gamma$-lactone with 23 carbon atoms and four saturated rings.

It is claimed that the steps in the synthesis of cortisone can be halved in number, were sarmentogenin available, to dispense with the number of steps in the synthesis starting from desoxycholic acid.

(*To be continued*)

Chlorine Content of Aluminium Paper Laminates

WHEN using aluminium foil as a functional—as distinct from a purely decorative—material, it was usually necessary to add either a coating or some other material, such as paper or transparent film, before the foil could carry out its job, which was mainly that of a moisture vapour barrier, said Mr. W. A. Harrington (Venesta, Ltd.), in his paper on "Aluminium Foil as a Packaging Material." This was read at a recent meeting in Manchester of the Northern Branch of the Institute of Packaging.

Experiments were being made in this country, said Mr. Harrington, and in Scandinavia with a heavier gauge coated foil which would do the job formerly accomplished by the traditional butter wrapper consisting of thin foil laminated to parchment in which the duty of the foil was the exclusion of light, protection against pick-up of extraneous odours, and enhancement of appearance of the pack.

The addition of paper to the aluminium foil created certain chemical problems which had to be solved, to prevent damage to the container and, in some cases, its contents. For foil and paper laminates, it was necessary to check the chloride and sulphate content and also watch for free acidity in the paper.

Equilibrium moisture content in this country was in the region of 7 per cent, and unless the chloride figure (expressed as chlorine) was less than .07 per cent, corrosion of the foil would almost certainly take place, showing as unsightly white worms or blotches.

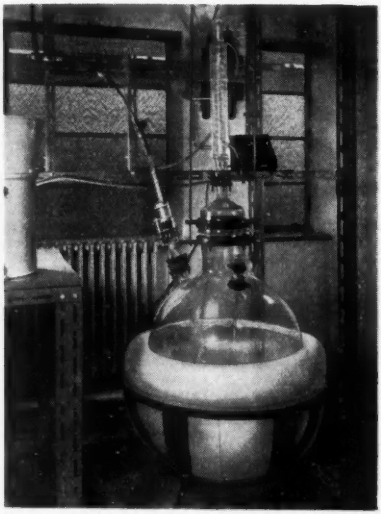
Large numbers of wads for jar lids, etc., disfigured by white stain resulted from using backing material of high chlorine content. In one instance, a foil and paper laminate held in this country for some time before being shipped to Colombo was dispatched in good condition, but after picking up additional moisture in that more humid climate, raising its content to about 9 per cent, the chlorine in the paper found sufficient moisture to corrode the surface of the foil.

Work was now proceeding on an investigation into the use of inhibitors with adhesives.

PLANT HEATING DEVELOPMENTS

Enlarging the Scope of Electric Surface Appliances

by H. REIK, M.Sc., A.M.I.E.E., A.M.I.Mech.E.*



[Courtesy, Therapeutic Products, Ltd.

An advanced form of electrically heated glass processing equipment, employing a mechanical stirrer and refluxing appliances and a 100*-litre Isomantle with an adjustable stand*

SHORTLY after the war, electric heating mantles for laboratory glass ware were introduced. In the form of Isomantles, these consist basically of heating wires interwoven with glass yarn to form a pliable heating mat of the required wattage, shaped to surround a particular vessel or column. The whole is lagged with glass wool (bat mats) and fitted with an outer layer of glass cloth.

The advantages of uniform heat distribution—safety, inertness to chemicals and the fact that liquids with distillation temperatures of up to 360° C. can safely be handled—have commended this method, particularly for laboratory use.

It is rather surprising that surface heating has so seldom been applied to metal plant. Isomantles for glass flasks of 50 to 100-litre capacity have been in use for some time. They have a loading of 3000 and 4000 watts respectively, providing 5000 and 6500 CHUs in the liquid itself. Even larger units are being designed in co-operation with the glass plant manufacturers.

These plant mantles have several circuits so that the upper levels can be switched off or moderated as the level of the liquid drops during batch distillation. A typical control unit, contains four separate energy regulators, each controlling one circuit. The flexibility of this method is evidenced by the variation provided where top condensation is to be avoided. For this, Isotopmantles are made to supply slightly more heat than needed for keeping the top half of the flask at distillation temperature. Their rating is usually one-third to one-quarter that of the bottom mantle.

Isojackets, the column and pipe heaters of cylindrical shape, are designed to overcompensate amply for heat losses in the pipe lines or columns to which they are applied. They can be slid onto existing assemblies, as they open axially.

The construction of Isomantles allows for flexibility in design and standard units are made with holes in the bottom to allow for drain-off cocks or circulation processes, and equivalent provision can be made for side necks.

The CHUs provided by the Isomantle are limited by its surface; 6000 Watts (10,000 CHUs) for 100-litre Isomantle and Topmantle should not be exceeded. This limits the distillation rate and a successful solution has been found by introducing circulation heating and providing the additional heat needed with a high wattage Isojacket or double walled boiler heat exchanger.

High Wattage Isojacket

The latter type is the newest development. In a typical example a standard 6, 9 or 12 in. glass column has an inner column of 4, 6 or 9 in. bore, fitted so as to produce a double walled vessel with a passage of ½-1 in. between the inner wall of the outer column and the outer wall of the inner column.

A high wattage Isojacket is then applied to the outer column, while a similar jacket,

* Consultant to Isopad, Ltd.

having its element fitted to its circumference, is inserted into the inner column. This allows for the application of increased wattages (up to 13½ kW per assembly of Isomantle and boiler heat exchanger).

Full wattages can be used up to 200° C., but it is advisable slightly to reduce the power applied (if automatic temperature control is not employed) when running at higher temperatures; a minimum heat gradient, determined by the thickness of the glass and the nature of the fluid is necessary for heat transfer.

Heat Distribution

The following table gives the sort of wattage ratings for various sizes of high wattage jackets and boiler heat exchangers and CHUs available in the liquid at various temperatures. The figures are approximate.

The first figure of the type number denotes the length of the heating jacket in inches, the second figure denotes the diameter of the column wall to which the jacket is applied, in inches.

In the case of viscous fluids or where the heat exchangers are used at the bottom of stills to replace steam coil heat exchangers it is often advisable to reduce the above figures by 25 per cent. Large boiler heat exchangers running at 670 Watts/sq. ft. surface density should be used, either with thermocouple or thermostat type heat control set to a limited temperature of 400° C. or slightly less.

All units are designed to run at black heat if necessary. The wattage input is controlled by Simmerstat type energy regulators. These are time cycle controllers incorporating a switch giving a varying "on"-"off" cycle, which facilitates energy changes from 100 per cent to 10 per cent of total thermal capacity. Variac auto transformers can also be used, while transformers with tapping control are often applied for higher powers. These are particularly useful in the case of metal plant, where they also serve as step-down transformers, reducing the element to earth potential.

When higher powers, high temperatures and expensive assemblies are involved and the possibility of human error must be avoided it is advisable to use either automatic temperature control, probably in the form of a thermocouple and relay control set to any desired temperature.

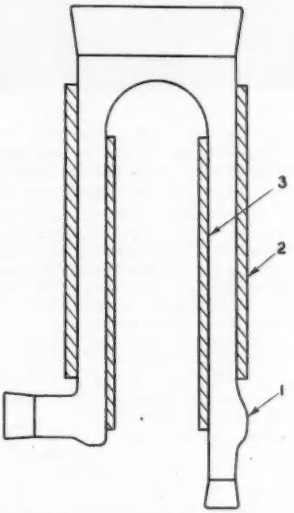
A simpler type of control uses a high temperature liquid which expands in a fine-bore pipe. The only disadvantage of this type is the length of stem needed, but it is suitable for the larger type units. It is good practice to use independent energy and temperature controls.

It is customary to employ for glass con-

(continued at foot of next page)

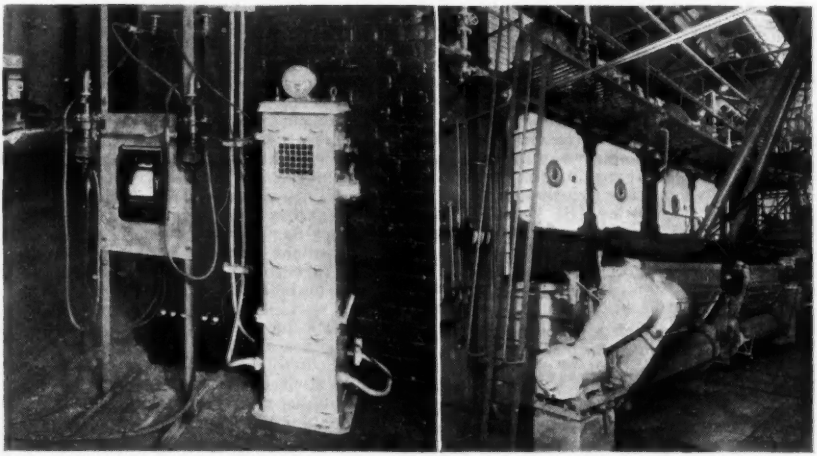
BOILER HEAT EXCHANGER RATINGS

Heater Type	Watts	C.H.U. available in liquid at 150° C.	200° C.	250° C.	300° C.	350° C.
18/4½ or 12/6½	1,000	1,600	1,600	1,450	1,300	1,100
18/6½	1,500	2,400	2,400	2,170	1,930	1,650
18/6½ and 18/4½	2,500	4,000	4,000	3,600	3,200	2,700
18/9½	2,400	3,850	3,850	3,500	3,150	2,600
18/9½ and 18/6½	3,700	5,000	5,000	4,500	4,000	3,400
24/9½	3,000	4,800	5,800	4,350	3,850	3,300
24/9½ and 24/6½	5,000	8,300	8,300	7,500	6,700	5,700
18/12½	3,000	4,800	4,800	4,350	3,850	3,300
18/12½ and 18/9½	5,000	8,300	8,300	7,500	6,700	5,700
24/12½	4,000	6,500	6,500	5,900	5,200	4,400
24/12½ and 24/9½	7,000	11,600	11,600	10,500	9,300	8,000
30/12½ and 30/9½	8,700	14,300	14,300	13,000	11,500	9,600



The principle now being employed to make possible greater use of electrical surface heating in a circulating system. The column (1)*, fitted with an Isojacket* (2)*, sheathes an inner column, to which is applied another heating jacket* (3)

IMPROVING THERMAL EFFICIENCY



The CO_2 recorder, which provides a reading ahead of the ID fans as a measure of combustion efficiency within the furnace. Right: The Babcock and Wilcox WT boilers at Laporte Chemicals, Ltd. Pulverised coal is fed from the pipes into troughs and sifted into the chain grate stokers to feed the furnace

THE desirability of saving fuel in the heavy industries, ensuring that all coal should be put to the best use, was emphasised by the Minister of Fuel and Power (Mr. Hugh Gaitskell) at a conference of the technical Press, held in Luton this month. An opportunity was also afforded by Laporte Chemicals, Ltd., to inspect the continuous process for the production of barium chemicals.

Although Laporte Chemicals is confident that its fuel efficiency is of a high standard, Mr. L. P. O'Brien, the company's chairman, has expressed the opinion that the Ministry's travelling team of fuel technologists might find a number of minor defects which could be remedied to constitute a worthwhile economy (THE CHEMICAL AGE, *62*, 5).

The team is spending a month at Luton, studying fuel consumption at each phase of the production process, at the end of which its findings will be reported to the company and remedial suggestions made.

PLANT HEATING DEVELOPMENTS

(*continued from previous page*)

densers heat transfer figures of up to 50 CHU/sq. ft. 2° C. These figures cannot be used in conjunction with plant type Isoheaters as the glass plant concerned has a wall thickness which may be five times that of the coils used for condensers or steam-type heat exchangers. 5-10 CHU/sq. ft. 2° C. are good average figures. The upper limit can be exceeded in cases of liquids with favourable film coefficients.

Glass wool lagging is taken as having a thermal conductivity of 0.30 or less CHU/cu. ft. 2° C. per hour. As the average lagging thickness of plant type Isomantles is 2½-3 in. they will run at over 95 per cent. efficiency under favourable conditions. Boiler type heat exchangers have nearly 100 per cent efficiency for the inner jacket and about 93/95 per cent efficiency for the outer jacket, giving a combined efficiency of over 95 per cent.

Designers should assume 500 Watts per sq. ft. without circulation and up to 700 Watts per sq. ft. with circulation.

Isoheaters for metal plant up to 500 gal. capacity use glass lapped, braided and silicone dipped heating elements as well as a special layer of glass cloth between the heating panel and the metal surface. This will give high insulation value but will not make the heater waterproof, so that spillage on to the elements has to be avoided. The metal parts should always be well earthed.

PRINTING INK TECHNOLOGY

Electronics as an Aid to Colour Measurement

As a result of the advances in printing ink technology, achieved during the past quarter of a century by a few laboratories in three or four different countries, a stage has been reached when it seemed that the tail was wagging the dog—the tail being the printing ink industry and the dog being the printing industry, said Dr. R. F. Bowles (B. Winstone & Sons, Ltd.). He was taking part in a survey of "The Relation of Paper and Ink in Printing," by representatives of the paper, printing and printing ink industries, at the meeting of the London section of the Oil and Colour Chemists' Association, on January 12.

Physical Characteristics

He felt sure that future developments also would be along those lines rather than on any more empirical ones which might be more applicable to other industries.

The problems of printing ink technology, said Dr. Bowles, were physical and, as usual, they had a chemical background. Certain physical properties of inks were essential, and over the last two or three decades the technologists had fairly successfully devised means of measuring them. The three types of physical properties it was most important to measure were colour, consistency and drying.

Colour was the most important physical attribute of a printing ink, and unfortunately it had been last to be scientifically developed so far as its measurement was concerned. Referring to the high degree of sensitivity of the human eye, and the comparative neglect of the development of physical instruments for measuring colour, Dr. Bowles said that colour matching was the point on which there had been most disagreement. The modern developments in electronics, however, had now given us the recording photometer, which was capable of giving a record of colour, irrespective of the human eye. That was the greatest single development in the colour measuring field during the last 20 years.

Unfortunately, the electronic instruments were still prohibitively costly, and in consequence were being introduced into the industry extremely slowly. As an example of the present tendency, however, Dr. Bowles quoted the new three-colour standards for printing inks, issued by the British Standards Institution, which gave a final reference to a special photometric standard. It could be expected that in another decade a photometric curve might well be an initial point of reference.

As to consistency, the various printing processes involved such varying requirements in ink that it had been necessary to explore the whole of the rheological field. For example, inks such as the photogravure ones were to all intents and purposes Newtonian fluids; for off-set and lithographic printing the inks required were thixotropic suspensions; and for copper-plate inks and steel engravings there were required dilution systems, which became thinner rather than thicker. Those different types of rheological behaviour could be differentiated by the empirical flow test, details of which had been published in the technical Press 18 months or two years ago.

Several methods of drying had been known for a very long time, and in the last 20 years sufficient work had been done to give a broad understanding of the subject. Oxidation drying was now quite well understood, which was due mainly to work done outside the printing ink or the paint industries. The oil and rubber people had studied it, and he recommended the reading of the excellent survey on the subject published in the quarterly review of the Chemical Society (first number of 1949).

Absorption and Evaporation

Absorption drying had lagged behind: probably it was thought necessary to understand oxidation drying first. Absorption drying was now being studied in a large number of laboratories, and certain information was already available which enabled it to be applied. The reflectance technique, whereby the difference in reflection with time from the surface of an ink immediately after printing was recorded, enabled one to study how the ink medium filtered into the paper and left a matrix of oil and pigment on the surface, which eventually dried to give the final film.

Evaporation, which appeared to be the simplest mechanism of drying, had received comparatively little attention, perhaps because it appeared to be so simple. Very little absolute information was available, for the subject had not been studied sufficiently fundamentally. There was no fundamental information available in the literature at all on the evaporation of any pure liquid. It was the least

understood section of the problem of drying, but efforts were being made to study and understand it scientifically.

Developments to which Dr. Bowles drew attention were the heat-set inks, in which the drying was accelerated from the normal seven or eight hours to a split second; drying of inks by precipitation; and the use of colloidal media for the production of quick-setting inks, which had enabled the setting time to be reduced from the normal half-hour or so—as it was some 20 years ago—down to two or three seconds. There had now been a compromise on a setting time of two or three minutes, the point being that the matter had been studied so that the setting time was definitely under control; the inks could be so arranged that they would set in two seconds, two minutes, half-an-hour, or whatever time was required. One was no longer at the mercy of the materials one had to use.

There was still a great necessity, Dr. Bowles concluded, for more co-operation between the paper maker and ink maker; the more advanced one became in study, the more necessary was co-operation.

A Filtration Process

In the course of the discussion which followed the reading of the several papers, Dr. Julius Grant (Thos. Owen & Sons, Ltd., paper makers), replying to a question concerning the fundamental process of absorption drying, said that mainly—and certainly in the case of water—it took place by the entry of the liquid between the fibres of the paper. There was no evidence that there was any great degree of absorption by the fibres themselves in normal circumstances.

Dr. Bowles agreed and, as a corollary, he said he had found, as the result of his studies of the residual film on the paper, that there was a simple filtration and a penetration of the medium into the absorbent paper, leaving a concentrated suspension of the pigment in a portion of the medium on the surface of the paper. Curiously enough, that occurred to only a limited extent, limited presumably by surface tension forces, and the film which eventually remained consisted of an approximately cubic packing of particles in the residual medium on the surface of the paper. Normally there was just sufficient medium there to hold the particles in that cubic packing, and apparently nothing could remove that amount of medium from the film.

Mr. S. Beard said there were mainly two sorts of properties on which the absorption seemed to depend. First, when an ink was applied to paper, the diluent, whether volatile or non-volatile, must be free to penetrate the paper, leaving on the surface a concentrate which bound the pigment to the paper. If the whole ink were too stable, then, although it was composed of ingredients which would dry rapidly on the paper, no appreciable drying would take place. Secondly, one paper apparently, under oil absorption test, would have drying properties equal to those of another, but for some reason a known ink would flake to a certain extent on one and not on the other.

Persistent Films

Dr. Bowles said the point was a fairly general one. Using a non-drying ink—one which did not dry by oxidation or by any chemical process—if one deposited a film on the surface of the paper and took precautions so that the filtration did not occur, obviously the film would remain as a liquid on a semi-solid. At the other extreme, the film was deposited from an ink containing either a volatile solvent which would evaporate and leave sufficient pigment to bind into the surface, or where the interfacial forces between the ink medium and the paper were so small that more of the medium would penetrate into the paper than was necessary to hold the pigment to the surface.

It was just possible, said Dr. Bowles, to do that under exceptional circumstances; and in both those hypothetical cases there would be a condition of powdering in which the dry pigment could be rubbed from the surface. That condition, however, was the exception rather than the rule, and usually the ink maker arranged his pigment and vehicle so that the film remained on the surface; in some cases it would remain in an unoxidised semi-liquid state, and in others it would eventually oxidise and dry to a hard rub-proof film.

Packaging

INITIAL response to the suggestion to hold in London a second National Packaging Exhibition has resulted in the securing of the National Hall, Olympia, for the period January 30-February 9, 1951. The Institute of Packaging, which announces that plans will be available within a month, is again to collaborate with Provincial Exhibitions, Ltd., in sponsoring the exhibition. The British packaging team, which, under arrangements of the Anglo-American Council on Productivity, has been in the U.S.A., is due to arrive in England on February 2.

Chemistry Education in Spain

Advanced Standards in Science and Engineering

THE claim that chemistry instruction in all its forms has now attained a high level of efficiency and comprehensiveness in Spain was made in a paper by Dr. S. Medina-Castellanos, which was read at the 22nd Industrial Chemistry Congress, held recently in Barcelona. A special issue of *Chimie et Industrie*, and the November issue of *ION*, containing abstracts of this and other papers, included illustrations of university chemical departments in Madrid, the laboratory of the School of Industrial Engineers in Barcelona, and that of the School of Industrial Chemical Experts in Tarrassa.

Fields of Study

The author recalled that there are now chemical departments in a dozen Spanish universities: Madrid, Barcelona, Granada, Murcia, Oviedo, Santiago, Salamanca, La Laguna, Sevilla, Valencia, Valladolid, and Zaragoza. The fields of chemical study in these establishments extend to the most advanced theory and practice with a good groundwork of mathematics and physics. Generally the curricula were similar to those taken in English universities, extending for five years or more, and including a doctorate thesis in or near the final term. A doctorate in industrial chemistry was an almost exclusive feature of Madrid University. At the other universities, the doctorate degree was more general and possibly also more theoretical.

Particular importance was attached to the profession of the industrial engineer, for which training there were three establishments: at Madrid, Barcelona and Bilbao. They were known as Escuelas de Ingenieros Industriales, and comprised three principal categories: mechanical, electrical, and chemical.

Throughout their training the engineering students were in close touch with actual factory conditions and problems. They were selected by an entrance examination, and during the first three years their studies were general engineering common to all the above categories; but for the last year or two they specialised in one only of these three divisions. For the chemical engineer a wide knowledge of metallurgy in most of its branches is deemed essential.

Closely related to the industrial engineers were the chemical industrial experts, of which there were four main divisions: mechanical, electrical, textile, and chemical. Of the twenty schools provided for their training, about twelve had courses for the chemical expert, extending for four years. At the Barcelona, Bejar and Tarrasa schools there were specialised courses for the textile chemist.

Attention was drawn in particular to the very individual Instituto Quimico de Sarria, near Barcelona, established in 1905 by a Catholic religious body, and providing, in addition to a thorough training in chemical science and practice, a rigorous moral or religious discipline. A rather strict entrance examination is imposed here. Successful students gain the diploma of IQS.

Other chemical training centres include those for directors of chemical industry, the pharmacy and speciality faculties at the universities, and schools for agricultural, mining, and other specialised chemists. The main centre for the first is the Instituto de Quimica Applicata at Barcelona, established in 1915, where, it is claimed, new pedagogic methods originated for instruction in chemistry. It possesses extensive laboratories, industrial plant, libraries, and information bureaux, and many of its former students are among the leading chemical industrialists in Spain.

Post-Graduate Help

There are also many post-university and specialised centres for most branches of scientific study, including chemistry, mostly under the supervision of the Consejo Superior de Invectigaciones Cientificas. For pure (theoretical) chemistry there is the Patronato Alfonso el Sabio with the Instituto Alonso Barba (Chemistry) and the Instituto de Santa Cruz (Physics). For applied chemistry there is the Patronato Juan de la Ciervas, and several institutes for the different branches of chemical industry: iron, cement, oils and fats, welding, paints and varnishes, etc.

Belgian Pyrethrum

Greater competition with Indonesia from the Belgian Congo is indicated by the selection of Goma, province of Kivu, as the centre for processing the pyrethrum blossoms. The removal from the present site at Costermansstad is to form a better link between the respective planters of Northern Kivu and Ruanda.

IMPROVED CONTAINER DESIGN

Safer Conveyance of Solids and Liquids

THE problem of devising a satisfactory corrosion-resistant lining for metal packages has been a subject of experiment for many years. Rubber, enamel, lacquers and other coatings have been tried with varying degrees of success. In many cases the application of a coating has necessitated the fabrication of drums from thick sheet, since damage to the drum frequently causes the coating to crack and expose the steel. Other coatings involved complex and costly methods of manufacture.

It is hoped to produce soon a polythene lined drum, which may be the solution of some manufacturers' difficulties. The advantages of polythene are that it has flexibility, plasticity and at the same time is resistant to tearing and scratching, it weathers well, is tasteless, colourless and non-toxic. It is chemically inert to a very wide range of substances, including most acids at normal filling, storage and transport temperatures.

The drums will be in production during 1950.

The superior protective properties of aluminium as compared with steel recommend its use for packaging a large number of products. From the technical point of view, however, its lightness and the considerable difficulties involved in satisfactorily welding aluminium by mass production methods have delayed its employment on a very large scale.

To solve these two main problems an aluminium drum within a steel drum has been devised. The aluminium-lined drum consists of a strong steel outer covering with an inner wall of electrically-welded aluminium sheet.

A carboy cushioned on sponge-rubber buffers within the hamper

The alternative method of adding strength to aluminium came with the introduction of aluminium alloys, which, with high speed electric welding of side seams, has led to the development of almost as wide a range of aluminium-alloy packages as of steel.

The heavy-gauge plastic liner, with welded tube passing through the drum neck to ensure the contents have no contact with metal

The principle of an inert plastic lining is employed in a patent product of Reads, Ltd., the container makers, of Liverpool, in association with Tanks & Linings, Ltd., Droitwich. This, Nutrapac, is a combination of a full-aperture steel drum and an inner collapsible bag or liner manufactured from heavy-gauge polyvinyl-chloride or other inert material. The liner is so constructed that when full it conforms exactly to the internal dimensions of the drum. Seams of the liner are electrically heat sealed to prevent leakage.

Contents can be poured out, drawn out through a tap or blown out by compressed air injected between the drum and the liner. The plastic liner can then be completely removed for cleaning and replaced.

The carboy hamper consists of a reinforced drum with a deep, detachable lid which is secured to the body by steel clips. The carboy is simply and firmly fixed in the hamper where it is cushioned on sponge-rubber buffers. The main object of this container is to protect the neck of

(continued overleaf)

NEW BOARD OF TRADE DEPARTMENTS

Better Integration of Responsibilities

THE home side of the Board of Trade has been re-organised as from January 16. The object has been to reduce the number of divisions in the board with which a single industry or firm has to deal. The work on each raw material has now been put as far as possible in the division concerned with industries which consume that raw material.

This means that the Raw Materials Department and Priorities Division will disappear as separate entities and their functions will be merged in the industrial work of the Industries and Manufactures Divisions. The four divisions concerned with particular industries include:—

Division IM2A: Cotton, wool, rayon, nylon and silk (the raw materials and all manufacturing processes); flax (spinning and all subsequent processes); other textiles and garments.

Division IM2B: Organic and inorganic chemicals; fertilisers; rubber and tyres; pottery; miscellaneous commodities (including china clay); consumer goods industries (including bedding and laundries).

Division IM2C: Timber, furniture and timber-using industries; pulp, esparto, paper, paper products and printing; hides and leather; footwear, gloves and leather goods; jute, sisal, manila, hemp and supply of flax.

Division IM2D is concerned with tourist industry; tobacco and trades with a predominant entrepot interest. The Films Branch will continue as before but will have in addition responsibility for film base and for sensitised photographic materials.

At the same time the general work of the home departments of the Board of Trade not related to particular industries, has been concentrated in three divisions to be known collectively as Industries and Manufactures I as follows.—

Division IM1A: All price control; restrictive practices; retail trade dstributions; consumer needs.

Division IM1B: Import policy and import licensing (with Import Licensing Branch); United Kingdom tariffs and key industry duties.

Division IM1C: Investment and general industrial policy; industrial buildings; weghts and measures (with Standards Branch).

This re-organisation will not affect the distribution of industry and Regional Division, the divisions dealing with insurance, companies and bankruptcy, the Patent Office, or the Administration of Enemy Property Department.

Lithopone Freed from Control

THE Board of Trade announces that from January 31 it will cease to control the allocation of lithopone manufactured in the United Kingdom. The distribution of imported lithopone is already free from control.

Home production is considered to be not yet sufficient to meet all orders received by the makers and for the present they will not be able to meet all demands in full, the Board of Trade anticipates.

IMPROVED CONTAINER DESIGN

(continued from previous page)

the carboy from breakage. There are two fall-down type riveted side-handles.

Carboys fitted in conventional type hampers are usually packed again into a wooden case, when the contents are for export. The carboy hamper greatly reduces labour and material costs.

The incorporation of pressed-out roller hoops in a drum body presents no technical difficulty with drums which have a welded side-seam, but in the case of tinplate drums with a locked side-seam, owing to the several folds of metal in the locked seam, the problem was an intricate one.

After considerable research a 5-gallon drum in light-gauge tinplate was developed. It can often be used on a returnable basis, owing to the extra strength given by roller hoops.

Drums having a ringseal neck, claimed to be proof against pilfering, have now been provided with a pourer spout fitting incorporated with the neck, the shape of which is said to give better flow-control with less spillage.

The ER interrupted chimb drum, designed to strengthen the top seam or chimb, and also simplifies stacking, and another recent innovation, the Flexspout closure, suitable for containing internally lacquered packages, have earlier been illustrated and described in some detail (THE CHEMICAL AGE, *61*, 522).

EXPANDING CAPACITY IN SOUTH AFRICA

Widening Fields of Chemical and Paint Production

From Our CAPE TOWN CORRESPONDENT

THE first experiment in South Africa to surface gravel roads with calcium chloride has been started about three miles from Bloemfontein by the Provincial Administration in co-operation with African Explosives and Chemical Industries, Ltd. Because of the shortage of calcium chloride, which is imported from Britain, the experiment is restricted to a limited distance. The hygroscopic effect of calcium chloride in gravel road surfaces is to prevent dust erosion, which causes potholes and corrugation. The road surface is reported to have taken on the appearance of a macadamised road.

* * *

Production of magnesium hydroxide has been started by the Vrany Chemical Corporation of S.A., Ltd., a company recently formed to extract salt and chemicals from sea water. Magnesium salts are first extracted, the residue is treated to extract common salt, after which the potassium and bromide salts are separated. A property containing a big limestone deposit for use in this operation has been acquired, and lime-burning kilns have been erected. Refined table and dairy salt, besides commercial salts, will be extracted early this year. The Vrany Salnova Works, Ltd., a second company of the same group (African & Overseas Enterprises, Ltd.), has acquired a dry lagoon at Port Elizabeth for development simultaneously with that at Saldanha Bay. The object there is to extract salt from the concentrated brine.

* * *

The South African Paint Manufacturers' Association and the Council of the Transvaal Chemical Manufacturers' Association is again pressing for Imperial pints and quarts to be the compulsory standard in the Union. There is at present nothing to prevent the use of the shorter American measures. American manufacturers of paint and chemicals have been able to sell in the Union "gallon" tins of products containing about four-fifths of similar "gallon" tins of Britain or South Africa. American manufacturers have enjoyed the advantage of apparently lower prices. South African manufacturers seek to enforce the compulsory adoption of regulations as stringent as those in the United States against "foreign" measures.

C. F. and H. Rolfe Bros. (Pty.), Ltd., Germiston, Transvaal, has added to its normal chrome products pure chrome oxide green and zinc chromates. They are being sold to manufacturers of roofing and other paints and to the rubber and plastics industries. The zinc chromate is manufactured to the highest oversea specifications. Current shortage of supplies of raw materials is causing concern to manufacturers in the paint and associated industries. Industrial Chemical Products (S.A.) (Pty.), Ltd., 139 London House, Loveday Street, Johannesburg, is making a new rubberised underbody coating, claiming that it prevents "drumming" and "tinniness" in sheet metal structures. The coating is applicable to motor vehicle bodies, metal sinks, steel furniture and lifts. The Netherlands African Paint Factory (Pty.), Ltd., Elsies River, near Cape Town, is to produce high-quality nitrocellulose alkydised motor vehicle body lacquers and synthetic enamels.

* * *

An application has been made by paper manufacturers for the rebate of import duties on sizes of all kinds used in the paper-making industry. Since 1925, resin in bulk for this purpose has enjoyed a rebate. In recent years, however, manufacturers have adopted the use of proprietary sizes which they find more satisfactory for certain types of paper. These sizes, however, are dutiable (10 per cent). The industry asks that this duty be rebated and the Board of Trade and Industries, noting the rapid growth of the paper industry, has recommended to the Government that the present rebate facilities on resins should be extended to all sizes.

* * *

The South African Council for Scientific and Industrial Research is investigating the industrial suitability of South African clays, which it is aiming to classify with their base exchange properties, binding powers, etc. So far this investigation has not been directed towards the assistance of any particular industry. With one exception, all clays used in South African foundries are imported, but the council states that a clay has been discovered locally which appeared to be a bentonite. The foundry industry is now being encouraged to put this and other clays to a series of practical tests.

The Chemist's Bookshelf

CANNING PRACTICE AND CONTROL. 3rd edition revised. Osman Jones, F.R.I.C. London, 1949. Chapman & Hall, Ltd. Pp. 322. 36s.

The diverse range of specialist subjects whose several contributions make possible the efficiency of the modern canning industry—metallurgy, chemistry, microbiology, etc.—is called to mind by this book. The vital importance of the chemist, "who must be a watch-dog while avoiding giving the impression that he is a policeman," is emphasised in a chapter devoted to the cannery laboratory and its work.

This is a revised 3rd edition, giving a fuller description of, among other matters, the manufacture of tinplate and the causes of corrosion and discoloration. The newer methods of analysis, including chemical and biological assays for vitamins are discussed. Methods of examining suspected matter in cases of food poisoning are also described and there is a chapter on the preparation and use of culture media.

The large selection of photographs of plant and equipment, and a number of photomicrographs of spoilage organisms form a valuable complement of the text. Tribute is paid by the author to Mr. T. W. Jones, who has been unable to participate in this edition and has resigned his former co-authorship.

MODERN PLASTICS. Harry Barron. London. 1949: Chapman & Hall, Ltd. Pp. 779. 50s.

This book is a revised and greatly enlarged second edition of a work published in 1945, dealing with the entire range of synthetic and semi-synthetic resins and with analytical aspects of these materials and physical testing methods. The work as a whole suffers from incomplete revision, *e.g.*, on page 9 it is stated that Germany ranks second in the production and consumption of plastics. This was undoubtedly true in 1943 but it certainly is not to-day. Britain is a close runner-up to the U.S.A., in the output of plastics. Figures for the annual production of certain structural and industrial materials in the U.S.A. are given for the years 1939 and 1944. The total for the latter year in plastics is 90 million lb. and aluminium 2179 million lb. (page 5). It is a pity that statistics over five years old should be quoted, as they lose their point. From the figures given it might be assumed that the output of plastics, taking the world viewpoint, lags far behind that of aluminium, whereas to-day, a tonnage of plastics equal to that of aluminium is being produced. In the chapter dealing with acrylics there is no mention of one of the more important applications of British acrylic sheet—as corrugated sheeting for roof lighting, which reaches a production exceeding 1000 tons a year and is by far the most important use found for acrylics. Surprisingly enough, generous mention is made of polyurethane, which is chiefly of academic interest, and no reference is made of polytetrafluoroethylene and other fluoroplastics, which are becoming so important in the chemical and electrical industries.

The first edition of Modern Plastics was easily the most important book on the subject published in 1945, but one cannot make a similar claim for this second edition. As a general reference work, Dr. Barron's book will serve a useful purpose.

Gas Leak Detector

INFORMATION of interest to the chemical industry concerning a new gas leak detection method and fluorine chemistry has been declassified and will be made available for commercial applications by the U.S. Atomic Energy Commission, Document Sales Agency, Box E, Oak Ridge, Tennessee. The "halide torch" method of gas detection is the subject of a report by Dr. A. C. Schmidt (Document 2678). The basis of gas detection is the introduction into the gas system of freon or other halogen containing gas which produces a characteristic green flame on meeting a hot copper plate in the test unit burner. American methods of production of elemental fluorine (now costing about $1 lb.) are the subject of Document 2671, "Chambers Works Process for the Manufacture of Fluorine in East Area Carbon Anode Cells" (Dr. A. C. Stevenson).

Technical Publications

ORIGINALLY intended as a refresher course for men of the paint and allied industries returning from the Forces, a series of lectures organised by the Oil and Colour Chemists' Association was delivered in Greater London in 1946. These have now been published in book form as "An Introduction to Paint Technology." The book is divided into four parts: Oil, varnish and lacquer media; pigments; paints, enamels and other pigmented finishes; the manufacture of finishes. It is being distributed at cost price (5s. 3d., post paid) by the OCCA.

* * *

THE character and philosophy of William Backhouse, of Swallowfield, his influence on his spiritual son and heir, Elias Ashmole, and the importance of his place in 17th century alchemy are discussed in the December, 1949, issue of "Ambix," journal of the Society for the Study of Alchemy and Early Chemistry. Other features include the scientific experiments of Sir Walter Raleigh in the Tower of London and the alchemical papers of Dr. Robert Plot (1640-1697).

* * *

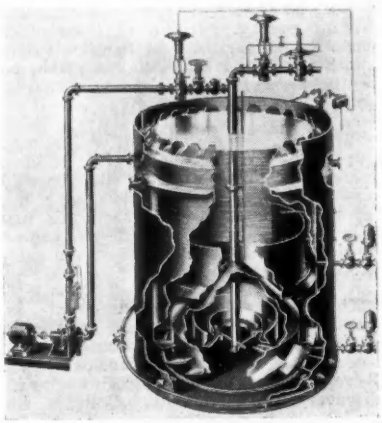
"THERMAL INSULATION" by G. N. Critchley is the subject of Progress Review No. 4 in the January issue of the *Journal of the Institute of Fuel*. Papers on the "Coke-fired Downjet Furnace," delivered at the meeting of the Institute of Fuel in London this week, are also published.

* * *

NEW plant, now in operation, to process powdery iron ore to usable size and to recover iron from blast furnace flue dust is described in the "American Metal Market" (December 24, 1949). Progress of steelmaking during the year is reviewed, and there is a survey of research work in the industry and of refractory and analytical development, improvements in spectroscopy, etc.

* * *

TO aid manufacturers in assessing the costs of producing films the British Engineers' Association and the British Electrical and Allied Manufacturers' Association have published a "Guide to Industrial Film Making." It provides comprehensive information concerning production and includes particulars on distribution, technical film terms, etc. It is supplied by the associations concerned and costs 2s. post paid.



Sectional view showing the ingenious assembly employed in the reaction tank of a new U.S. cold-process slurry type precipitating water softener and coagulator

THE importance of the human side of industry is emphasised in a New Year message for 1950 by Lord McGowan in the January issue of the "I.C.I. Magazine." The first of a series of articles on "Raw Materials of the Chemical Industry" deals with coal, and another feature is devoted to the Nobel Division's Tuckingmill factory. The issue is illustrated with a number of excellent photographs.

Instruments for Canada

BRITISH scientific instrument makers will be well represented at the Canadian International Trade Fair which is to take place in Toronto from May 29 to June 9.

They will combine with other British manufacturers in an endeavour to secure a higher volume of exports to Canada, a market still largely dominated by the U.S.A. In 1948, for example, 58.5 per cent of Canada's total imports came from the U.S.A., as against 11.4 per cent from the U.K.

It is hoped to show that Britain can supply practically all the scientific instruments, previously bought from America, comparing favourably with U.S. goods in quality and price.

· PERSONAL ·

DR. F. D. RICHARDSON will relinquish his present position as head of the chemistry department of the British Iron and Steel Research Association at the end of the present month, having been appointed Nuffield Research Fellow in extraction metallurgy at the Royal School of Mines, London. This new fellowship is to permit the establishment of an academic research group to work on the extraction metallurgy of both ferrous and non-ferrous metals. Dr. Richardson's team will concentrate on the thermodynamics of slag and metal solutions in extractive processes.

The council of the Institution of Electrical Engineers has awarded the Faraday Medal to SIR JAMES CHADWICK, the atomic scientist, to whom was awarded the Nobel Prize for Physics in 1935, following his discovery of the neutron. For his work during the war on the use and control of nuclear energy, he received the United States Medal of Merit.

The retirement is announced of MR. S. W. A. WIKNER, who has been works manager of the St. Anthony's by-product section of the Newcastle-upon-Tyne and Gateshead gas undertaking since 1919. Presentations were made to Mr. Wikner by the officials and works staff. MR. A. PILLANS has been appointed by-products manager in succession to Mr. Wikner.

PROF. W. DAVIS, M.A., professor emeritus of textiles, University College, Nottingham, has been elected an honorary life member of the Textile Institute. Now living in retirement in Douglas, Isle of Man, Prof. Davis became a member of the institute in 1910, and served continuously as a member of the institute's council and on its committees from 1926 to 1949.

Some 200 members and guests attended the 31st anniversary dinner and social of the Liverpool and North-Western section of the Royal Institute of Chemistry, held in Liverpool, on January 12. The chairman was MR. J. F. CLARK, Liverpool city analyst.

MR. D. M. CARNEGIE, Blackheath Park, London, S.E., retired manufacturing chemist, left £59,239 (net personalty £59,064).

The council of the British Engineers' Association last week elected as their president for the current year MR. KEITH FRASER, A.M.Inst.C.E., M.I.Chem.E., who is chairman of the business of W. J. Fraser & Co., Ltd., which his great-grandfather founded. He is also a director of Babcock & Wilcox, Ltd., and Dewrance & Co., Ltd., and a member of the Board of Studies in Chemical Engineering, London University, and of the grand council of the FBI. Vice-presidents are MR. DAVID D. WALKER, joint managing director of Evershed & Vignoles, Ltd., re-elected, and MR. E. BRUCE BALL, managing director of Glenfield & Kennedy, Ltd.

COLONEL VICTOR DUNN WARREN, a leading Scottish executive of I.C.I., Ltd., and Lord Provost of Glasgow, has been presented with the Royal Humane Society bronze medal and parchment in recognition of his attempt to save a man from drowning during a fishing trip in Loch Arkaig last May.

Obituary

THE death occurred on Monday at Timperley, Cheshire, of DR. A. E. M. G. GILLAM, D.Sc., F.R.I.C., a member of the Council of the Chemical Society, who enjoyed a number of distinctions in organic chemistry, notably in relation to his work on vitamin A. In the wide field in which he recorded important findings the application of ultra-violet radiation claimed much of his attention and he did much to enlarge the technique of its application to organic materials. He had spent some 15 years at Manchester University, where he became senior lecturer in chemistry in 1946.

Ethyl Alcohol Production

Total U.K. production of ethyl alcohol by the fermentation-distillation process during the distilling year ended September 30, 1949, was 63,981,291 proof gal., states H.M. Customs and Excise. (This includes 11,258,658 gal. distilled in Scotland at distilleries using malt only, and 16,306,785 gal. at distilleries using malt and other materials.)

HOME

I.C.I. Entertains the Children

More than 1000 children of the employees of Imperial Chemical Industries (Dyestuffs Division), Huddersfield, were the guests of the directors at a visit to the pantomime at the Huddersfield Palace Theatre.

More Scope for Soap Boilers

An amendment, as from January 29, of the Soap (Maximum Retail Prices) Order, 1947, re-introduces a number of special brands of hard soap which went out of production during the war. The total amount of soap available to the public will not be affected.

Visits to Laboratories

Final year students from the college of the Pharmaceutical Society and members of the chemical society of Chelsea Polytechnic were among recent visitors to Glaxo Laboratories, Ltd., Greenford, Middlesex. They were introduced to members of the Research Division and shown work in progress.

Borax and Boric Acid Prices

Taking advantage of lower freight rates to this country from the U.S.A., Borax Consolidated, Ltd., has announced a reduction in its U.K. selling prices for all grades of borax and boric acid of £1 per ton as from Monday last. Owing to higher costs of distribution on small deliveries, the surcharges for quantities of less than 3 cwt. have been increased.

Good Week in the Collieries

Britain's coal production last week showed an unusually rapid recovery from the slackening resulting from Christmas and New Year holidays, the production being more than in any equivalent week since 1940. Comparative figures are:—Last week: 4,462,900 tons (deep-mined 4,220,100 tons, opencast 242,800 tons); previous week: 3,715,500 tons (deep-mined 3,528,100 tons, opencast 187,400 tons).

New Source for Newsprint

Bagasse, the waste product of the sugar cane, may prove to be a new means of producing newsprint if tests now being carried out in the U.S.A. prove successful. Investigations by the Kinsley Chemical Company, Cleveland, Ohio, in co-operation with the Chemical Paper Manufacturing Co., Hoylake, Massachusetts, are designed to produce a type of newsprint having the characteristics of stock made from wood pulp.

Duty Exemption

The Treasury has made an order exempting calcium citrate (fermentation) from Key Industry Duty for the period beginning January 14-March 31, 1950.

Better Grease Recovery

The Bradford sewage authority has recommended the acceptance of a tender of £2250 for a solvent pilot plant to produce paler grease in the effluent recovery plant. The lighter coloured product is expected to sell more readily in European grease markets.

E. I. Du Pont Sales Record

Establishing a peace-time record, the 1949 sales of E. I. Du Pont de Nemours & Co., Inc., exceeded $1000 million, J. Warren Kingsman, the company's vice-president has disclosed. Sales in 1948 produced $968,731,000. Large expansion of nylon and synthetic fibres is the keynote of the present and future programme.

£250,000 Plant for Greece

The Stockport chemical engineering firm of Simon Carves, Ltd., has secured a contract worth more than £250,000 to supply sulphuric acid plant to the Hellenic company of Chemical Products and Fertilisers, Ltd., Athens. It was obtained in competition with Belgian, German, and United States firms.

Paraffin Wax Price Increases

Increased prices for paraffin wax and scale were announced last week by Shell-Mex and B.P., Ltd. The new charges per ton, *ex* store or refinery, for paraffin wax of 1-ton lots and upwards are from £68 5s. to £101 17s. 6d., according to grade. (Previous prices were from £50 15s. to £74 3s. 6d.) The price of scale, per ton, is £51 17s. 6d. for 1-ton lots. (£40 17s.) Prices of quantities under 1 ton of both these materials are calculated with an addition proportional to 15s. per ton.

Pollution of Atmosphere Alleged

Dust and smell alleged to come from a new cement works at Pageswood, near Buckley, were the cause of a complaint made at the recent meeting of the Hawarden Rural Council Health Committee. Dr. Cathcart, who was asked to investigate, said that the firm concerned employed an electrostatic process for dust removal. It was not understood how the dust got into the atmosphere; samples of gases were being taken as they emerged from the kiln and went through the dust remover.

Next Week's Events

MONDAY, JANUARY 23

Institution of Rubber Industry

Manchester: Engineers' Club, Albert Square, 6.15 p.m. K. W. Hayes: "Some Aspects of the Stability of Compounded Latex."

TUESDAY, JANUARY 24

The Royal Institute of Chemistry

Slough: Public Library, William Street, 7 p.m. N. Booth: "Careers for Chemists."

Society of Dyers and Colourists

Manchester: 16 St. Mary's Parsonage, 7.15 p.m. G. K. Mecklenburgh (British Nylon Spinners, Ltd.): "The Dyeing and Finishing of Nylon Textiles."

The Plastics Institute

London: Waldorf Hotel, Aldwych, W.C.2., 6.30 p.m. Symposium: "Synthetic Finishes. G. Barnet (Bakelite, Ltd.): "Stoving Phenolic Lacquers"; F. Armitage (Lewis Berger, Ltd.): "Styrene Copolymers"; W. F. Wilson (Cellon, Ltd.): "Cellulose Finishes."

WEDNESDAY, JANUARY 25

The Royal Institute of Chemistry

Manchester: Gas department showrooms, Town Hall Extension, 6.30 p.m. Annual general meeting, 6.45 p.m. Dr. H. J. T. Ellingham (secretary of the Institute): "Professional Chemistry."

Dublin: University College, Upper Merrion Street, 7.45 p.m. E. C. Knight: "Chemical Activities of Micro-Organisms."

British Association of Chemists

London: The Wellcome Research Foundation, Euston Road, N.W.1, 7 p.m. Dr. T. P. Hughes (Royal Aircraft Establishment): "Chemistry in Relation to the Aircraft Industry."

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 6.15 p.m. (Food Group, Nutrition panel). Dr. W. F. J. Cuthbertson: "The Vitamins: Up-to-date Review."

Society of Leather Trades' Chemists

Manchester: P. Danby: "Pigment Finishing and Aspects of Research into the Problem."

Royal Statistical Society

Birmingham: Chamber of Commerce, New Street, 6.30 p.m. W. A. Bennett: 'Statistical Quality Control Applications."

THURSDAY, JANUARY 26

Sir John Cass Technical Institute

London: Jewry Street, Aldgate, E.C.3, 6 p.m. First of eight lectures to be given on Thursday evenings. Eric Walker (barrister-at-law): "Patents and Industrial Design Protection."

Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. L. W. Lockton: "Some Applications of the Modern Oil-engined Locomotive."

Institute of Metals

Sheffield: Grand Hotel, 6.30 p.m. (with the Sheffield branch of the Electrodepositors' Technical Society). J. C. Chaston: "Silver-Copper Alloys with Special Reference to the Temper-Hardening of Sterling Silver."

Royal Statistical Society

Sheffield: University, St. George's Square, 6.30 p.m. Miss J. Keen (G.E.C. Research Laboratories): "Statistics and the Craftsman."

FRIDAY, JANUARY 27

The Chemical Society

Glasgow: Royal Technical College, 7.15 p.m. Prof. F. S. Spring: "Recent Advances in the Chemistry of the Steroids."

Society of Chemical Industry

London: Chelsea Town Hall, King's Road, S.W.3, 7.30-11.30 p.m. Buffet dance.

SATURDAY, JANUARY 28

Institute of Physics

Cardiff: University College, 2 p.m. (South Wales Branch). W. H. Walker: "Physics in the Mining Industry."

Textile Institute Anniversary

BRADFORD will be the scene of a celebration dinner to be held by the Textile Institute on Tuesday, March 14. The occasion will mark the 25th anniversary of the granting of the Royal Charter on March 11, 1925, and the 40th anniversary of the founding of the Institute on April 22, 1910.

The choice of Bradford for the celebrations is a happy one, for it was largely due to the energy and work of a native of the city, Mr. John Emsley (president of the Institute from 1922 to 1926) that the charter was granted.

Problems connected with the reclamation of fibres will be discussed at a one-day conference on April 18.

OVERSEAS

Pakistan Merchants

The name of the Karachi Indian Merchants' Association (established 1902) has been changed to the Pakistan Merchants' Association.

U.S. Aluminium Production Down

Strikes are said to have been mainly responsible for the decline in output of primary aluminium in the U.S.A. in October. Total production reached only 45,790 short tons, the lowest level since February, 1948. Increased sales during the month reduced stocks to 46,607 short tons. Prices of primary pig and ingot remained unchanged.

Crude Oil for Jugoslavia

Oil supplies from the U.K. to Jugoslavia will comprise 200,000 tons of crude oil in 1950, 150,000 tons in 1951, and 100,000 tons in each of the three following years. This is revealed by the Anglo-Jugoslav trade agreement, concluded last month, under which Britain will supply crude rubber at an annual rate of 2000 tons. The U.K. will receive mainly timber imports.

Indian Atomic Energy Commission

The Government of India has set up an Atomic Energy Commission, which is advised by a Board of Research consisting of nine scientists and by a Cosmic Ray Research Committee. Steps had been taken to conserve thorium and allied deposits in India. The export of monazite, the principal source of thorium, from the shores of Travancore, South India, is prohibited.

Norway's Aluminium

Production of aluminium in Norway last year was expected to total 36,500 tons, and this year production is expected to increase by another 30 per cent, states the bulletin of the Royal Norwegian Information Service, London. The industry does not anticipate any difficulties in selling this increased production. Demand is strong both inland and abroad. In Norway the price of aluminium has been unchanged since 1940.

Successful Synthesis of Mica

The successful synthesis of mica, which may make it possible for the U.S.A. to meet its own needs (it is the world's largest consumer), has been announced by the U.S. Secretary of Commerce. The synthetic mica, crystallised successfully by Dr. Herbert Insley, Alvin Van Valkenburg and Robert Pike, of the U.S. National Bureau of Standards, has essentially the same properties as natural mica, and has a greater ability to withstand high temperatures. The synthesis employs four materials—quartz, magnesite, bauxite and a fluorosilicate compound serving as a crystallising agent and conferring the heat resisting property.

Fluorspar in S.W. Africa

Important mining developments are taking place in the Otjiwarongo district of South-West Africa on behalf of the iron and steel corporation in Pretoria, Iscor. At Marburg Mountains there is an extremely large deposit of low-grade fluorspar which Iscor intends developing. The deposit, known for a long time, has hitherto not been economically workable. Iscor, however, will be able to use certain grades satisfactorily as a flux in steel processing. There is no immediate market for export fluorspar of these grades, but current investigations suggest that an export market may be secured.

British Firms at U.S. Fair

THE size and scope of the first American international trade fair, to be held in Chicago from August 7-19, are indicated by the fact that it will be housed in four different buildings covering nearly 1 million sq. ft.

One of the main purposes of the fair is to help Western European countries to sell their goods in the United States; a large proportion of the space will accordingly be allotted to Western European exhibitors, and a European Trade Fair Board, under OEEC auspices, is being formed to co-ordinate the plans of exhibitors for attracting U.S. buyers.

Dr. J. Kunstenaar, of the U.S. Department of Commerce, has already visited London and had talks with the Board of Trade, with Sir Cecil Weir, chairman of the Dollar Exports Board, and Sir Guy Locock, who is adviser to the F.B.I.

Intending exhibitors may obtain general information about the fair from the exhibition and fairs divison of The Board of Trade, and space can be booked through Mr. A. P. Wales, 16 Shelton Street, W.C.2

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CARBOMETALS, LTD., London, E.C. (M. 21/1/50.) December 12, first deb., to Westminster Bank, Ltd. securing all moneys due or to become due to the Bank; general charge. *£6000. March 10, 1949.

SYNTHELENE, LTD., London, E.C. (M., 21/1/50.) Manufacturers of lacquers, polishes, etc. December 9, £110 and £110 debs. respectively to C. J. N. Etches, Seaford, and C. H. Masters, Hook (Hants.); general charges.

Satisfaction

ANGLO-ARGENTINE GENERAL ELECTRIC CO., LTD., London, W.C. (M.S. 21/1/50.) Satisfaction December 22, of charge reg. August 16, 1949.

New Registrations

Chemicals & Adhesives, Ltd.

Private company. (476,986). Capital £1000. Chemists, oil and colourmen, manufacturers of chemical and other preparations, cements, oils, paints, glues and adhesives, etc. Secretary: D. W. Henley, 144 Bromley Road, Beckenham.

Conimex, Ltd.

Private company. (476,903). Capital £1500. Manufacturers of cleansing materials, preparations and compounds, detergents, etc. Directors: W. E. Hickman-Hill and J. R. Chapman. Reg. office: Eltsac Factory, Low Road, Conisborough.

Staple Essential Oils & Chemicals Co. Ltd.

Private company. (477,045). Capital £2000. Manufacturers of oils, chemicals, aromatic chemicals and compounds, etc. Directors: D. Engel, V. Engel, and M. O'Regan. Reg. office: Sardinia House, Sardinia Street, W.C.2.

Change of Name

The name of Hampstead Insecticides, Ltd., has been changed to H.O.I. Services, Ltd.

Fluorine Case Ended

WITHDRAWAL of the petition of suspension and interdict made by Ben Nevis Distillery (Fort William), Ltd., and Joseph William Hobbs against the North British Aluminium Company was announced last week, thus closing one of the longest court cases in recent years.

Counsel for the petitioners had previously alleged (THE CHEMICAL AGE, *61*, 867) that the Aluminium Company was not making sufficiently rapid plant alterations. The petitioners are now stated to be satisfied with the progress of the remedial work and, according to a statement issued by the solicitors for both parties, all outstanding differences have been disposed of.

Sites for Industry

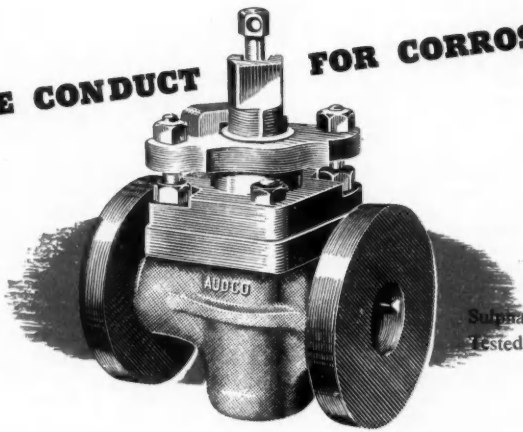
THE facilities for industry in the district round the River Tees are well described and illustrated in a brochure sponsored by the Tees-Side Development Board. It gives an encouraging picture of the work of the board, which has done much to turn Tees-side, until recently a depressed area, into a well-based centre for productions of many different kinds. Everything practicable is being done to prevent a recurrence of the conditions which at one time drove skilled men to other parts of England in search of work. The shipping and docking facilities have been greatly extended, new roads have been built and the excellent water supplies have helped to make the district attractive to light and heavy industries seeking new sites.

Fusion Welded Pressure Vessels

ANNOUNCING the formulation of a new code by the British Standards Institution for the construction of vessels for the chemical and allied industries (THE CHEMICAL AGE, *61*, 907) attention was drawn to the first published specification in the series, "Fusion Welded Pressure Vessels for use in the Chemical and Allied Industries."

It is emphasised by the British Standards Institution that this publication (B.S. 1500) is a provisional standard only and it is hoped that manufacturers will read it critically and submit their comments to the institution. The present standard is not the final form.

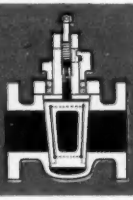
SAFE CONDUCT FOR CORROSIVE FLUIDS



Sulphate Resisting Type S.R.
Tested to 100 lbs./□" Air

For the safe and efficient handling of corrosive fluids,

Audco valves are made in a wide range of corrosion-resisting materials, specially designed to meet the many and varied requirements of the Chemical Industry.



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DIRT CAN'T GET IN—FLUID CAN'T GET OUT

Audco's patented lubricating and plug-seating features ensure positive sealing, certain and easy operation, and low maintenance. The seats are always sealed by lubricant, ensuring rapid and positive closure when required.

Audley Engineering Co. Ltd., Newport, Shropshire

The Stock and Chemical Markets

SPECULATION about the General Election again caused caution and uncertainty in stock markets and buyers have been holding off. Further declines in British Funds have suggested that the big financial institutions may be postponing purchases in the Gilt-edged market. There has been, so far, no evidence of renewed official support for the market from the Government broker.

The downward trend in British Funds has been reflected in the industrial and kindred sections, although most movemovements have not exceeded more than a few pence. The prevailing City view is that if, as the General Election develops, indications should point to a change of Government, industrial shares are likely to show a strong recovery. In the sections threatened by nationalisation, insurance shares have rallied under the lead of Prudential "A" but there have been allround losses of up to 1s. in iron and steel shares. These, however, were attributable to growing indications that net profits of companies concerned are likely to be affected this year by higher costs.

Chemical shares have been somewhat more active, but at the time of writing have been unable to move against the easier trend of markets. Imperial Chemical have receded further to 41s. 3d., at which there is a yield of a little short of 4⅝ per cent. Monsanto were 50s. 7½d. and yield rather more than 4¼ per cent, Albright & Wilson have changed hands around 29s. 3d., Laporte Chemicals 5s. ordinary around 9s. 4½d., and Fisons around 26s. 4½d., while W. J. Bush strengthened 1s. 3d. at 61s. 3d.

There was a sharp fall in Glaxo Laboratories to 40s., heavy selling having followed the share bonus distribution. In other directions, Amber Chemical 2s. shares were 4s. 6d., F. W. Berk 14s. 3d., Boake Roberts 25s. 6d., and Bowman Chemical 4s. ordinary 5s. 6d. Brotherton 10s. shares have been more active around 19s. 3d., and Pest Control 5s. shares were 8s. 4½d. L. B. Holliday 4½ per cent preference remained at 19s. 9d., and British Chemical & Biologicals 4 per cent preference 18s. 6d. British Glues & Chemicals 4s. shares firmed up to 19s. 3d., British Drug Houses were 6s. 6d., but Boots Drug have fallen sharply to 48s., following news of the share issue on bonus terms, which was regarded in some quarters as disappointing.

Borax Consolidated deferred were steady at 57s. 3d. in expectation of good results and maintenance of the dividend. Lever & Unilever were easier at 42s. 6d. as were Turner & Newall at 73s. 9d., United Molasses at 39s., and the 4s. units of the Distillers Co., then 16s. 10½d. Associated Cement receded moderately to 76s.

Iron and steel shares were affected by fears of growing costs and lower net profits this year, although the probability is that steel production will attain another high record. United Steel have eased to 26s. 3d., Stewarts & Lloyds to 52s. 3d., Dorman Long to 31s., and Thomas & Baldwins to 13s. 3d. Staveley fell back sharply to 79s.

Market Reports

A FAIR amount of activity is reported on the industrial chemicals market and new business has been on a good scale. The price position is unchanged and a strong undertone suggests an upward tendency. Export trade in chemicals and pharmaceuticals has been maintained at a satisfactory level during the past few months and it is expected that the industry will be able to sustain this trade despite the increasing competition in foreign markets. The tar products market is without any special feature and the price de-control has not had any effect on quotations. The restrictions on the day to day merchant business as a result of the nationalisation of the gas industry have taken much life out of the market.

MANCHESTER.—Generally firm price conditions continue on the Manchester chemical market and trading during the past week has been satisfactory in most sections. Contract deliveries of the alkalis and other heavy chemicals to home users are going forward steadily and a fair number of new inquiries have been dealt with. Shippers have again been active in business covering a wide range of products. Basic slag and one or two other sections of the fertiliser market are active.

GLASGOW.—Conditions in the Scottish chemical market have returned to normal during the past week and the supply position has been fairly satisfactory. No particular shortages have been noticed except of those materials which have been in that position for some considerable time. Prices have shown a general tendency to rise.

Slow Development of Spanish Fertiliser Industries

THE anomalous position of the fertilisers industry in Spain which has made extremely difficult the supply of home-produced materials in a market which has never been fully catered for has been well represented in a survey by F. Bustelo Vasques (*ION*, 1949, November, 651-55).

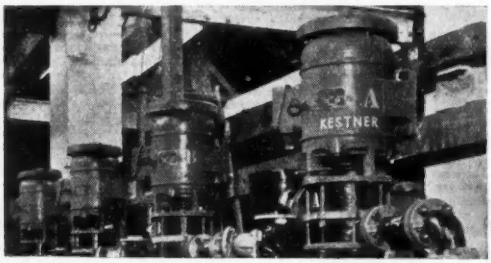
The first company to manufacture synthetic nitrogen fertiliser in Spain, Energia Industrias Aragonesas S.A., was producing 10 tons of ammonia daily in 1918 and required 22 years to reach the stage of paying its first dividend. The Societa Iberica del Nitrogeno, at La Felguera, paid its first dividend in 1947—24 years after it was established. Foreign competition, unmitigated by any effective tariff protection, restricted enterprise, so that supplies during the war were very inadequate. In 1946 Spanish imports of synthetic fertilisers represented 20,000 tons of nitrogen, less than 12 per cent of the estimated national requirement.

Prices of home-produced nitrogen fertiliser have been 20-50 per cent lower than the import prices, yet the home manufacturer has had to contribute to a compensation fund for subsidising imports.

Growing appreciation of the need of a strong and flourishing home fertiliser industry was shown in the official decree of 1940, and in subsequent official declarations, especially those of General Franco himself and of leading Ministers at the Barcelona Chemical Industry Congress in October last. Of the new enterprises which have now been established the three most important are the new factory in Bilbao of the Soc. Españ. de Fabricaciones Nitrogenadas, using coke oven gas of Altos Hornos de Vizcaya; the extensions of the Felguera factory of Soc. Iberica del Nitrogeno and the new plant at Barros; and the new works of Nitratos de Castilla in Valladolid.

Other plants built or in course of erection, especially for calcium cyanamide, are those of the Empresa Nac. Calvo Sotelo, at Puentes de García Rodríguez (La Coruña), and another at Escatrón (Teruel) for gasifying lignites, and at Puertollano (Ciudad Real) in connection with distillation of bituminous shales. By 1952 it is estimated that the total annual capacity of the three principal works mentioned should be 50,000 tons nitrogen, or 30 per cent of natural needs.

A BATTERY OF KESTNER'S GLANDLESS ACID PUMPS



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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order

ANGLO-AMERICAN COMPANY, producing cellulose for the Chemical and allied industries, require a **QUALIFIED PHYSICIST** for laboratory and process control work. Experience in our field not necessary. Age 20-25. Salary not less than £500. Applications, giving full details of education and qualifications, to **Chief Chemist, Holden-Vale Manufacturing Company Limited, Haslingden, Lancashire.**

ANGLO-AMERICAN COMPANY, producing cellulose for the Chemical and allied industries, require **TWO QUALIFIED CHEMISTS** for laboratory and process control work. Experience in our field not necessary. Age 20-25. Salary not less than £500. Applications, giving full details of education and qualifications, to **Chief Chemist, Holden Vale Manufacturing Company Limited. Haslingden, Lancashire.**

BY-PRODUCT PLANT OPERATOR, with varied practical experience, required. Age over 25 years; must be educated but not necessarily of degree standard. Good salary for right applicant. Apply, in confidence, giving details of experience, to **THE CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE COMPANY, LIMITED, The Old House, London Road, Horsham Sussex.**

SITUATIONS VACANT

CORROSION ENGINEERS—preferably not over 35, required for large oil company for Middle East duties for work connected with cathodic protection of thousands of miles of trans-desert pipelines and will include design, installation and operation of such protective schemes, together with study of pipe coating procedure and materials. Post offers extensive opportunities in new field to man of initiative.

Candidates for acceptability should have Honours Degree in Electrical Engineering or Physics or Physical Chemistry, with strong background of electricity and engineering and be able to combine first-rate theoretical background with bias to field work. Practical attitude and good knowledge of electro chemistry essential. Experience should include minimum of 5 years work in industry.

The appointment would carry substantial allowances and would be at salary commensurate with general acceptability; the service is pensionable. **Write, quoting No. 443 to Box 3248 c/o Charles Barker & Sons, Ltd., 31, Budge Row, London, E.C.4.**

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No. 203 One **DITTO.**

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No. 206 One **DITTO** of the same pattern, by **DOBSON & BARLOW.**

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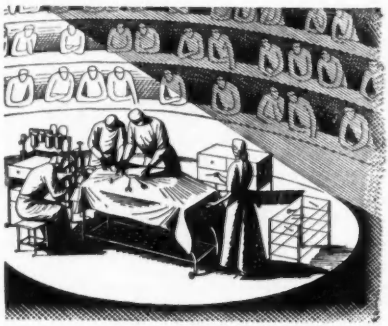

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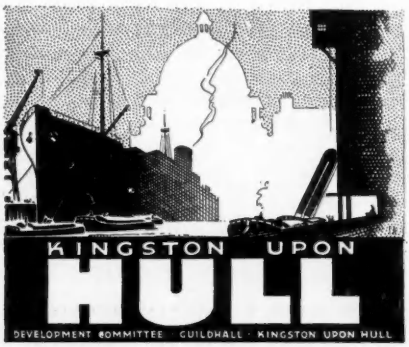

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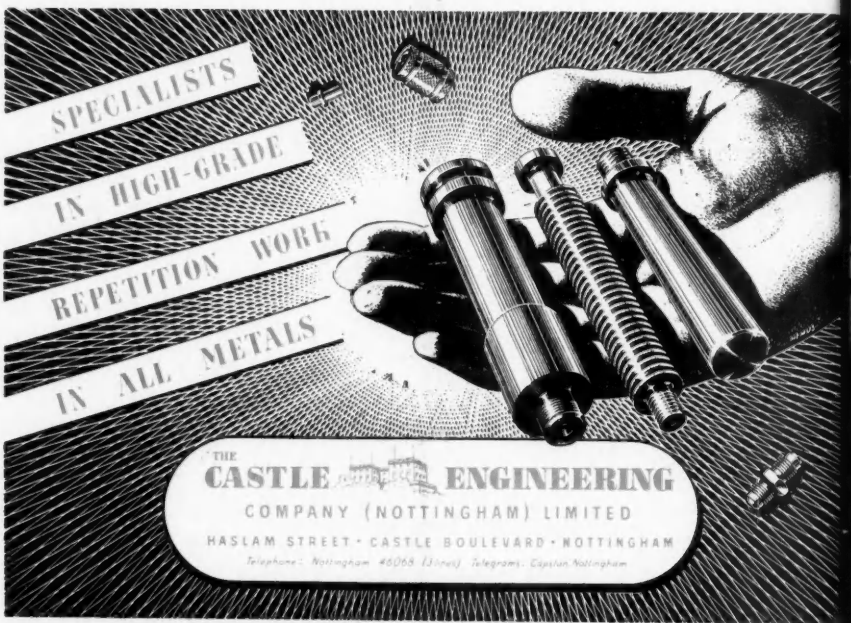

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